AMERICAN WOODWORKER

April 1990, Issue No. 13

Turned Birdhouses

Buyer's Guide to Carbide Saw Blades

New England Pine Cupboard Plans

Special Bonus: Index to Issues 1988-1989

$4.50

03

0 73361 64766 5

CONTENTS

Issue No. 13
March/April, 1990
COVER PHOTO: Sally Shenk Ullman

PROJECTS AND FEATURES

DEPARTMENTS

AMERICAN
WOODWORKER

EXECUTIVE EDITOR
David Sloan

ART DIRECTORS
Ayers/Johanek
Publication Design

ART ASSISTANT
Suzanne Burke

ASSOCIATE EDITOR
Fiona A. Wilson

COPY EDITOR
Nancy Wallace Humes

EDITORIAL ASSISTANT
David Sellers

PRODUCTION COORDINATOR
Judy Peek

SECRETARY
Michelle N. Peischl

CONTRIBUTING EDITORS
B. William Bigelow
Ernie Conover
Mike Dunbar
Nick Engler
Franklin H. Gottshall
W. Curtis Johnson
Simon Watts

PUBLISHER
Pat Corpora

ADVERTISING SALES MANAGER
James Owens

SALES SERVICE COORDINATOR
Sharon George

CLASSIFIED SALES REPRESENTATIVE
Louise Rader

ADVERTISING SALES OFFICES
East
33 E. Minor St., Emmaus, PA 18098
(215) 967-5171

ADVERTISING SALES REPRESENTATIVE
Renée James

West
James G. Elliott Company
714 W. Olympic Blvd., Suite 1120
Los Angeles, CA 90015
(213) 746-8800

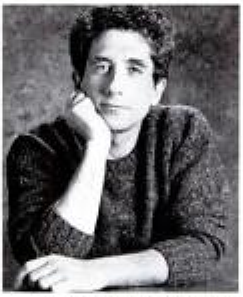
ADVERTISING SALES REPRESENTATIVE
Jacqueline M. Neumeier

CIRCULATION MANAGER
JoyceAnn Sokol

SUBSCRIPTION SERVICE MANAGER
Jane Hollingsworth Morris

PRODUCTION DIRECTOR
Harry Ardoline

AMERICAN WOODWORKER (ISSN 8750-9318) is published six times a year in January, March, May, July, September and November by Rodale Press Inc., 33 E. Minor St., Emmaus, PA 18098, (215) 967-5171. © 1990 by Rodale Press, Inc. Robert Rodale, Chairman of the Board; Marshall Ackerman, Vice Chairman; Robert Teufel, President; Paul Wessel, Chief Financial Officer. **SUBSCRIPTION RATES:** U.S. one-year $27, two-year $54. Single-copy $4.50. Canada one-year $35, two-year $70 (Canadian funds). Foreign, one-year $35, two-year $70 (U.S. funds). U.S newsstand distribution by Eastern News Distributors, Inc., 1130 Cleveland Rd., Sandusky, OH 44870. **SECOND-CLASS POSTAGE:** paid at Emmaus, PA and additional mailing offices. POSTMASTER: Send address changes to AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098. **CONTRIBUTOR GUIDELINES:** available upon request. We will treat unsolicited material with care, but cannot assume responsibility for loss or damage. Send a stamped, self-addressed envelope for return of material.



Carlyle Lynch died last December at the age of 80. *AW* readers will remember him as the man who penned those wonderful furniture drawings that have appeared in our pages. Carlyle loved old furniture, and it showed in his drawings. Those of us lucky enough to have met him in person will never forget the tall, soft-spoken gentleman from Virginia who was always so gracious and generous with his time and his knowledge. He was a craftsman, an artist, a teacher and a friend. We shall miss him.

A few unrelated matters worth mentioning:

Many of you have written us asking for an index to back issues of *AW*. In this issue you'll find the index for 1988 and 1989. To make it easier to find what you want, we've also included a "Quick Reference Guide" to projects and articles. We'll update the index at the end of each year and publish a revised index every year in the March/April issue.

You'll find another new section in this issue; our "Catalog Showcase" on pages 72 and 73. Those of you who are new to woodworking may not be familiar with many of the fine mail-order companies that carry hard-to-find tools, hardware and supplies in their catalogs. Our "Catalog Showcase" will tell you who's selling what so you can send for the catalogs that interest you.

To kick off the "Showcase" with a bang, we're having a drawing for an Elu $2^1/_4$-H.P. variable-speed electronic plunge router (Model 3338) with a retail value of $387. Here's how to get in on the drawing.

Turn to the "Catalog Showcase," and look for the reader service number of the catalogs that interest you. Then, circle those numbers on the "FYI Product Literature Card" that's bound into the magazine. Every reader who mails in the "FYI Product Literature Card" from the March/April issue will be entered in the drawing for the Elu plunge router. Even if you *don't* want any product literature, send in the card—you'll still be eligible to win. Entries must be postmarked no later than April 30, 1990 to be eligible for the router drawing. The drawing takes place May 13. We'll contact the winner by mail and make an announcement in the July/August 1990 *AW*. Good luck.

Last of all, I want to remind you that *AMERICAN WOODWORKER* is a reader-written magazine. We rely on you, our readers, to share your project and article ideas. Most of the articles you see in the pages of *AW* are written by readers—woodworkers who are not professional writers. If you have an article you'd like to write or a project you'd like to write about, drop us a line. We'll send you our "Guidelines for Authors," which explains how we work.

DAVID SLOAN, Editor

Sir:

I agree with the [Shaker oval boxmaking] system shown by Nick Engler (November/December, 1989 *AW*) who reported on the methods of my friend Larry Owrey, who learned boxmaking in a class I gave in 1986.

There is a variety of ways to do a task; there were differences among the Shaker craftsmen. But there are several statements in Engler's article that will cause new boxmakers real difficulty.

The first is the vagueness in defining the thickness of the bands—probably the biggest, single stumbling block to successful box bending. The statement made in the past [literature] that the bands in the nest of boxes will *vary from* 1/16 in. to 3/32 in. has been presented by Engler to be "1/16 in." for the three smaller boxes and "3/32 in." for the other four sizes. There is no indication of a middle thickness for medium boxes.

A #3 box made with a 3/32-in. hard maple band would be a stout box indeed, quite difficult or impossible to bend or tack.

Fractional dimensions are not adequate for measuring band thickness. A machinist's vernier calipers, which reads in thousandths-of-an-inch, will be of great help to woodworkers who make their own bands. The beginning size of 1/16 in., or .062 in. is an ideal thickness for the bands of the smallest two boxes (#0 and #1). I recommend increasing band thickness by .005 in. for each increase in box size. In other words, .067 in. for #2 box; .072 in. for #3 box; .077 in. for #4 box, etc. Two or three sizes can be lumped together for ease of band preparation, but a #3 box with a 3/32-in. band (.094 in.) would not be good advice.

Water temperature is one of the two factors that make a wood band pliable, moisture being the other. Engler states, "...heat the water so it steams but doesn't boil (about 150° to 170° F)." Soaking from 15 to 20 minutes, as Engler recommends, will saturate the 1/16-in. thick bands. It is not true that "if the wood breaks or splits when you bend it [after soaking for 15 to 20 minutes] it may need to soak longer." What is needed to maximize the bending is heat. Wood technology suggests that temperatures above 200° F are needed to gain this heat-aided pliability. So the best advice is to have your water tray temperature at or near boiling.

The style of the fingers on the box is more a matter of taste than objective standard. It is the boxmaker's signature, if you will. However, the fingers in the article were a bit unusual in the trade, and didn't follow classic Shaker form, as shown in published examples. I'm referring to the size of the fingers, the location of the tacks, and the manner of beveling the edges. The best advice is to look at the shop drawings made by Ejner Handberg in *Measured Drawings of Shaker Furniture and Woodenware* (1980, Berkshire Traveler Press, Pine St., Stockbridge, MA 01262) or his earlier book by the same publisher, *Shop Drawings of Shaker Furniture and Woodenware Vol. I*. Handberg accurately rendered a fine nest of boxes, probably made in Mt. Lebanon Shaker Village in the first half of the 1800s. You could do no better than to follow those proportions.

A point of historical interest: The box-numbering system that we use today originated with Ejner Handberg and did not exist among the Shakers. Many villages, but by no means all, made boxes, and those that did followed various sizes. The boxes referred to in Handberg's book increase in width 1 in. per size on the *half* inch, or 3½ in. for the #2; 4½ in. for #3; 5½ in. for #4 and so forth. By contrast, at Sabbathday Lake they increased on the full inch.

JOHN WILSON
Charlotte, MI

Sir:

The following comments apply to Ed Cowern's answer in the Q&A January/February, 1990 *AW*.

One of the advantages obtained by supplying motors from a 240-volt source rather than a 120-volt source is at the instant of starting. The starting current of a motor is initially several times the running current. For a given size of wiring supplying the motor, the drop in voltage at the terminals of a 240-volt motor will be half that for a 120-volt motor of the same size. The effect of this is that there is less voltage available in the 120-volt motor to overcome the inertia, as the motor is brought up to speed. The 240-volt motor will start faster. Another advantage of the 240-volt system is that the heat losses in the supply conductors will be 25% of those in the 120-volt system. This is because these losses are determined by multiplying the line conductor resistance by the square of the current. Double the current and you quadruple the watts lost.

P.S. I am a retired electrical engineer and unretired woodworker.

LEON DAVIS
Grants Pass, OR

Sir:

Get your children interested in woodworking at an early age. It will teach them the value of wood over plastic and get them away from the electronic games and the TV.

ALVIN H. SHERWOOD
Round Lake, IL

Sir:

Charles Harvey's answer to David St. George's question about bandsaw speeds for resawing (Q&A January/February, 1990 *AW*) was only partially complete. Unfortunately some bandsaw blades are of such poor quality that they will not resaw hardwood properly even if they are brand new. I have found this to be the case with blades supplied by a major manufacturer of bandsaws. I suggest that Mr. St. George switch blade brands if he is still having trouble. I've found Lenox blades to be excellent, but I'm sure there are other good brands also.

JOHN F. HESSELBERTH
West Chester, PA

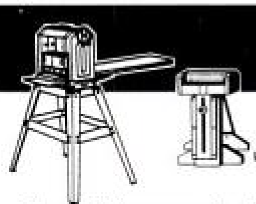
Sir:

I very much enjoyed the article about Wharton Esherick in the January/February issue. But, I have to say, I was amused that Sam Maloof nominated Esherick as "Dean of American Woodworkers." In my opinion, Sam owns that honor hands down. And that's not taking anything away from Mr. Esherick. Sam is the greatest.

R. JOSEPH RANSIL
Saratoga, CA

Send your comments, compliments, complaints and corrections to: Editor, AMERICAN WOODWORKER, *33 E. Minor St., Emmaus, PA 18098.*

Professional Quality Woodworking Machines From PENN STATE INDUSTRIES



Super 125 Planer

Portable with "Power Feed" • Shipped assembled • Retail value over $600.00

On Sale ... **$349.95**

Add $15 UPS Freight

This machine will pay for itself time and again by planing your own lumber. At 65 lbs, you can carry this Planer to a job site or mount it permanently in your workshop like any stationary machine. **You'll spend hundreds of dollars less** for this 12-1/2" power feed Planer than for a traditional stationary model of a similar capacity - with comparable results.

SPECIFICATIONS:
- **Knives**.... 2ea, 12-1/2" wide, HSS
- **Motor** - 16 Amp, 115V, 8000 RPM
- **Auto Feed rate** .... 26.2 FPM
- **Cutting speed** ..... 16000 Cuts/min
- **Thickness of stock** ..... 3/16" to 6"
- **Size** ... 15-1/2"H X 22"W X 21" Bed
- **Max Depth of cut** .... 1/8"
- **Machine Weight** .... 65 Lbs

Planer & Accessories Price List

Super 125 Planer - complete and assembled
#PLA .... $ 349.95 ($15 UPS)

Extra Set of 2 Knives - High speed steel, 12-1/2"
#PKN .... $ 25.00/set (•)

Dust chute - for vacuum takeoff of wood chips
#PDS .... reg. $24.00, **On Sale** .... $15.00 ($3 UPS)

Planer stand - Heavy duty, 27-1/2" high
#PST .. reg. $44.00, **On Sale**.................. $ 39.00 ($6 UPS)

Ball Bearing Rollers - (Minimum purchase 2 rollers)
Build roller stand, infeed/outfeed table etc. w/these 13"x2" Heavy Duty rollers. Includes FREE plans for building roller stand shown above. #BBR .... $ 6.50/ea ($3 UPS/per order)

(•) No freight chg if ordered w/Planer, otherwise add $3 UPS

DC-1 Dust Collector

On Sale ... **$189.95**

Add $20 UPS Freight

Keep your shop clean and safe from sawdust with our large capacity, commercial style system. This collector has up **to 10 times more air flow** than a Shop Vac and runs **much quieter.**

SPECIFICATIONS:
- **1hp, 110/220V (pre wired 110V)**
- **610 CFM air flow**
- **6990 FPM air speed • 2 Bags 15"dia X 22" • 20 gallon bag**
- **4" inlet • Casters on base • Weight 75 lbs • Size - 26"x15"x57"H**

FREE
with Purchase of DC-1
- *8 Feet Of Duct Hose*
- *4" To 3" Rigid Adaptor*
- *4" To 2" Flex Adaptor*
- *Plans For 2 Stage Setup*
- *Piping & Fittings Sources*

Free $15 Value

We unconditionally guarantee your satisfaction with our fine machines. All of our machines carry a Thirty day Money Back Guarantee and One year Warranty for Parts and Labor.

PENN STATE INDUSTRIES - A
2850 Comly Road • Phila, Pa 19154
Order Toll Free 1-800-288-7297 (Ext 90)
For information 1-215-676-7609 (Ext 15)
Visa, Master, & Discover Card accepted
Pennsylvania residents add 6% Sales Tax
Add UPS Shipping Charges as noted
Continental U.S. only (Call for shipping charges to other locations)

CIRCLE NO. 20 ON READER SERVICE CARD

BUILD YOUR OWN QUEEN ANN FURNITURE

with our wide variety of stock legs

— OR —
JUST ASSEMBLE OUR COMPLETE KITS

SOLID
CHERRY
WALNUT
MAHOGANY
OAK

Matching coffee table available

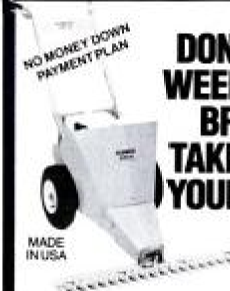
FREE BROCHURE, DEPT. AW-1

(no minimum required)

Adams Wood Products Inc.
974 Forest Drive, Dept. AW-1
Morristown, Tennessee 37814
Telephone: 615-587-2942

CIRCLE NO. 1 ON READER SERVICE CARD

WEED CONTROL WITHOUT CHEMICALS



DON'T LET WEEDS AND BRUSH TAKE OVER YOUR LAND

- **HANDLE THE TOUGHEST MOWING JOBS**
  Slices through 1½" saplings on the most difficult terrain.
- **QUICK AND EASY**
  38" cutting swath with exclusive power steering control.
- **COMMERCIAL QUALITY**
  The self-propelled sickle bar mower used by Rental Yards and Highway Departments.
- **BEST VALUE**
  The most mower for the least cost.

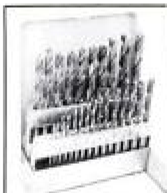
KINCO Dept. 0403
170 N. Pascal
St. Paul, MN 55104, 612-644-4666

SEND FOR FREE LITERATURE TODAY

☐ **YES**, send me **FREE** information including factory direct pricing, models, and special savings plans.

Name ____________
Address ____________
City ________ State ____ Zip ____

CIRCLE NO. 13 ON READER SERVICE CARD



the Fine Tool Shops

25-piece Brad Point Drill Set

Ideal for woodworking, these precision-ground drills come in 1/64th increments from 1/8" to 1/2". No "skating" even in oak or curly maple. Drill sizes over 3/8" have 3/8" shank. Metal drill index included.

200-0025 Brad Point Drill Set
.... $29.95

Plus $3 shipping

The Fine Tool Shops
P.O. Box 7091-P
Portsmouth, NH 03801
Ordering Information:
1-800-533-5305
☐Mastercard ☐Visa ☐Amex
Card No. ________ Expires ________
Name ____________
Address ____________
City ________ State ____ Zip ____
Daytime Phone ____________

FREE CATALOG with your order or check here for catalog only ☐

CIRCLE NO. 37 ON READER SERVICE CARD

A Round Peg in a Round Hole?

Q. *I want to change the chuck on my drill press, but I'm having a problem identifying the taper size on my drill-press spindle. The old chuck has no markings that relate to spindle taper. Any clues?*

DAVID UMPHRESS
Woodbury, NJ

A. A taper is a conical surface on the end of a shaft or in a hole. One kind of taper is a *self-locking taper*, which is used as a method of joining mechanical assemblies together, as in fixing a drill chuck to a drill-press spindle, or a lathe center to a lathe head stock. If the tapered parts match, the snug fit locks them together strongly enough to transmit considerable torque. Tapers are easy to disassemble, yet will always line up accurately when reassembled.

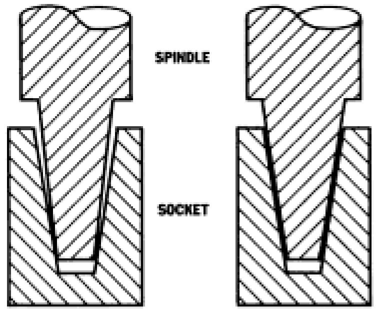
Taper connections are so common that several different types of self-locking tapers have been developed — each type representing a family of sizes with their own standardized dimensions. Some of the popular tapers have names such as "Morse Taper," "Jacobs Taper," "American National Standard Taper," and so on.

To identify your taper, measure the drill-press spindle very carefully. Record the larger diameter, the smaller diameter and the distance between them, which is the length of the tapered section. Don't include straight parts of the shaft in the measurements. Match up your measurements with the dimensions of a specific taper listed in tables in machinery text books or catalogs.

Tapered pieces must match exactly. A near match may seem to fit but can wobble dangerously or separate when run up to speed. (See drawing.) To test the fit of a tapered chuck, clean the spindle and socket, then rub a line of chalk down the side of the spindle. Seat the chuck gently on the spindle, and turn it 1/4 turn. Remove the chuck, and look at the chalk line. If it's smeared along the full length of the spindle, you have the right taper. If the chalk is not uniformly smeared, you may have the wrong taper. Also, inspect the spindle for burrs, embedded chips or other damage. A couple of careful strokes with a mill file can remedy a small amount of damage. Otherwise, a local machinist can true up the taper for you.

FRED MATLACK
Director, Rodale Press Design Group

SELF-LOCKING TAPERS



Sides of taper not exactly parallel.

Sides of taper fit exactly along length.

(TAPERS EXAGGERATED FOR CLARITY)

Sanding Paint

Q. *I'm using enamel paint on some reproduction blanket chests I've made. Someone told me that you should wet-sand enamel and other oil-base finishes for best results. I've never known anybody who bothered to sand between coats of any kind of paint. What do I gain by sanding? Is wetsanding really necessary?*

KEVIN DEXTER
Dallas, TX

A. The primary reason for sanding between coats is to level the surface before adding another coat. Since surface imperfections telegraph through the finish, a finish can only be as smooth as the surface it covers. Sanding removes brush marks, bits of dirt trapped in the paint and other imperfections.

The secondary reason for sanding between coats is to increase adhesion. Evaporative finishes, such as lacquer, dry through the evaporation of the solvents, leaving a coat of essentially unchanged components. Such finishes can be redissolved by their original solvent so that each subsequent coat partially dissolves the coats under it, affording outstanding cohesion. Sanding lacquer between coats does not increase its ability to stick to itself.

Oil-base enamel, however, falls into the category of reactive or "thermosetting" finishes. Once they are cured, reactive finishes cannot be redissolved by their own solvent, because they change chemically while drying. In the case of oil-base enamel, the film first tacks or "sets up" through evaporation, then cures through polymerization. This suggests waiting long enough so that the second coat doesn't remove the first. But, it also means you should apply the second coat soon enough so that the solvent can still "bite in" to the first coat. Oil-base enamel, however, has such excellent adhesion that it is probably not necessary to sand even if the previous coat has cured. If you choose to sand between coats, you will find that partially cured enamel tends to be somewhat "rubbery" and gums up your sandpaper, making the whole process more difficult. "Wet-sanding" with wet or dry sandpaper and a lubricant, such as soapy or plain water, facilitates the process considerably. Another option is to use the "self-lubricating" papers, such as 3M's Tri-M-ite Fre-cut, which can be used dry.

MICHAEL DRESDNER
Luthier and finisher
Zion Hill, PA

Planer or Sander?

Q. *I'm a beginning woodworker just learning about tools and methods. I understand both drum sanders and thickness planers are used to size and smooth the surface of stock before finishing, but what are the merits and shortcomings of each machine?*

JOHN CRITCHFIELD
Duenweg, MO

A. Planers and drum sanders both accomplish the same thing. They reduce a board's thickness and make the faces of the board smooth, flat and parallel. Planers cut the

CONTINUED

FRANK ROHRBACH

wood with rotating knives. Drum sanders sand wood away. Because they work differently, each machine does some jobs better than the other.

A thickness planer is best for surfacing rough-sawn boards or removing large amounts of stock quickly. Most planers can remove $^{1}/_{16}$ in. or more in one pass. A planed surface feels smooth to the touch, but needs to be scraped or sanded before finishing. This is because most planers leave "mill marks"—faint ridges from the rotating planer knives. These marks may be nearly invisible, but can show up when the wood is stained or finished. Most planers run into trouble on highly figured wood or wild grain, often tearing out the wood surface where the grain changes direction.

In general, a drum sander is used more for final surfacing. With a fine-grit abrasive it can produce a surface that's ready for finishing. With coarse abrasive, and multiple passes, a drum sander can remove a significant amount of stock, but not as quickly or efficiently as a planer. The big advantage of a drum sander is its ability to surface any wood (even bird's-eye maple) without a problem. It can sand across the grain—even end grain—so you can sand a glued up assembly, such as end-grain butcher block or a small face frame, in one pass. In this way, a drum sander is more versatile than a planer.

Actually, the two machines complement each other well—one takes up where the other leaves off. Shops that have both machines will often bring stock close to final thickness on the planer, and then run it through the sander to remove the last fraction of an inch and produce a finished surface.

Prices for small planers start at about $400, and drum sanders cost around $500 and up. Wide-belt sanders are another type of thickness sander, but they're more expensive, and found mostly in production woodshops.

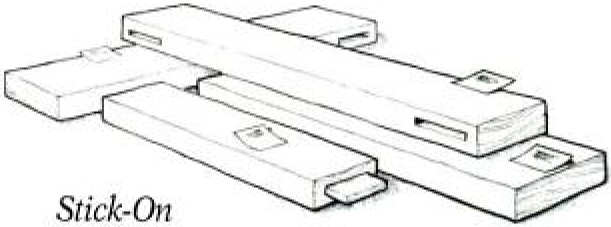
To sum up, if you're working with a lot of highly figured wood and can buy it close to the dimensions you need, a drum sander is a good choice. If you're surfacing rough-sawn boards or need to remove a lot of stock in a hurry, go with a planer. If in doubt, try renting the use of a planer or drum sander for an hour or two at a local cabinet shop—then decide what's best for you.

DAVID SELLERS
Editorial Assistant

Where To Find It

Shafts, couplings, universal joints and bearings of all kinds are available from Boston Gear Division, 14 Hayward St., Quincy, MA 02171, (617) 328-3300.

Got a woodworking question for the experts? Send it to Q&A, AMERICAN WOODWORKER, *33 E. Minor St., Emmaus, PA 18098.*



Stick-On Parts Labels

In any large woodworking project, keeping track of all the parts becomes an organizational problem. I don't like to write on the wood, because it involves an additional cleanup step later. I find it easy to keep track of my parts by labeling them with 3M "Post-it Notes." These little paper note sheets have a strip of adhesive across the top edge. The wood is not marred by the adhesive, and no cleanup is necessary. Post-it Notes come in pads in many sizes and are sold in office supply stores.

ALAN McMASTER
Brighton, MI

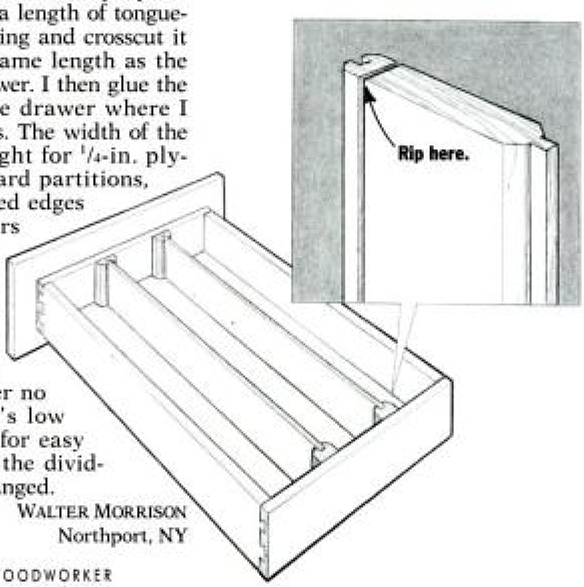
Glue-On Drawer Dividers

It doesn't make sense to install drawer dividers in kitchen-cabinet drawers without knowing the size of the objects the drawers will have to hold. I prefer to install the dividers on the job.

Instead of cutting divider grooves in the drawer parts, I merely rip the grooved edge off a length of tongue-and-groove planking and crosscut it into pieces the same length as the height of the drawer. I then glue the pieces inside the drawer where I want the dividers. The width of the groove is just right for 1/4-in. plywood or hardboard partitions, and the chamfered edges make the dividers look like they were custom made for the application.

Hot-melt glue works well since the joint is under no stress. The glue's low strength allows for easy removal, should the dividers need to be changed.

WALTER MORRISON
Northport, NY



Low-Tech Depth Stop

When drilling holes, I use tape for a depth stop. It never slips. Wrap the tape around the bit with an extra inch sticking out. As you near your desired depth, this "wing" of tape will begin sweeping away the wood chips around the hole. When all the chips are swept away, you've reached your desired depth.

AARON BLACKWELL
Simpsonville, SC

Cure for Hard Putty Sticks

Colored putty sticks are handy for filling nail holes, but they sometimes get hard with age and become difficult to use.

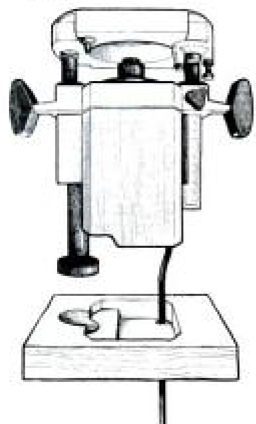
When this happens, I soften the stick before using it by immersing the end in very hot water for about a minute. Don't put too much of the stick in the water, or the stick will get too soft to hold properly.

WALTER MORRISON
Northport, NY

Bit-Changing Stand

Changing router bits can be difficult, time consuming and exasperating if your router won't rest upside down on your bench.

If your router has protruding handles, cords or switches, make a simple wooden jig to hold the router upside down.



DRAWINGS BY HEATHER BRINE LAMBERT

Start with a scrap piece of 2×4 about 7 in. long. Drill a hole for any handle or cord, then rout out a recess to match the shape of your router body. Cord holes should be large enough so that you can drop the plug end through the hole.

Clamp the jig in your bench vise to hold the router for changing bits.

GENE PAYNE
Sioux Falls, SD

Know a better way of doing something? Designed a clever jig? Send your woodworking tips, along with a sketch or a snapshot to: Tech Tips, AMERICAN WOODWORKER, *33 E. Minor St., Emmaus, PA 18098. We'll pay you $25 if we publish your tip.*

CASCADE TOOLS, INC.

P.O. Box 3110, Bellingham, WA 98227

SY BRAND *Finest Quality Carbide Tipped Router Bits & Shaper Cutters*

RABBETTING

SIZE	PART NO.	PRICE
1/4" Straight	C2030	$24.95
3/8" Straight	C2031	$26.95
1/2" Straight	C2032	$28.95
3/4" Straight	C2033	$32.95
1" Straight	C2034	$35.95
1-1/2" Straight	C2035	$36.95
2" Straight	C2036	$59.95

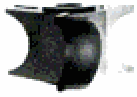
CORNER ROUND

SIZE	PART NO.	PRICE
1/4" Radius	C2059	$24.95
3/8" Radius	C2060	$26.95
1/2" Radius	C2061	$28.95
3/4" Radius	C2062	$35.95
1" Radius	C2063	$49.95
1-1/4" Radius	C2064	$49.95

FLUTE

SIZE	PART NO.	PRICE
1/4" Flute	C2046	$24.95
3/8" Flute	C2047	$26.95
1/2" Flute	C2048	$28.95
3/4" Flute	C2049	$32.95
1" Flute	C2050	$35.95

BEAD



SIZE	PART NO.	PRICE
1/4" Bead	C2052	$24.95
3/8" Bead	C2053	$26.95
1/2" Bead	C2054	$28.95
3/4" Bead	C2055	$32.95
1" Bead	C2056	$35.95

DOUBLE-FLUTED Straight

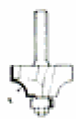
1/4" SHANK

PART NO.	D	PRICE
C1001	1/4	$6
C1002	5/16	$6
C1003	3/8	$6
C1004	1/2	$8
C1005	5/8	$10
C1006	3/4	$10
C1007	1	$12

1/2" SHANK

PART NO.	D	PRICE
C1008	1/4	$6
C1009	5/16	$6
C1010	3/8	$6
C1011	1/2	$8
C1012	1/2	$15
C1013	5/8	$10
C1014	5/8	$15
C1015	3/4	$10
C1016	3/4	$15
C1017	1	$12
C1018	1-1/4	$12
C1019	1-3/8	$15
C1021	1-5/8	$18

BEADING



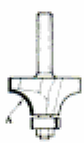
1/4" SHANK

PART NO.	A	PRICE
C1157	1/16 R	$11
C1158	1/8 R	$11
C1159	3/16 R	$11
C1160	1/4 R	$12
C1161	5/16 R	$13
C1162	3/8 R	$15
C1163	1/2 R	$16

1/2" SHANK

PART NO.	A	PRICE
C1171	1/2 R	$16
C1172	3/4 R	$20

ROUNDOVER



1/4" SHANK

PART NO.	A	PRICE
C1174	1/16 R	$11
C1175	1/8 R	$11
C1176	3/16 R	$11
C1177	1/4 R	$12
C1178	5/16 R	$13
C1179	3/8 R	$15
C1180	1/2 R	$16

1/2" SHANK

PART NO.	A	PRICE
C1187	1/2 R	$16
C1188	5/8 R	$20
C1189	3/4 R	$20
C1190	7/8 R	$34
C1191	1 R	$34
C1192	1-1/4 R	$40

DOVETAIL

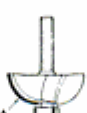
1/4" SHANK

PART NO.	D	PRICE
C1067	1/4	$7
C1068	3/8	$7
C1069	1/2	$7
C1070	9/16	$8
C1071	3/4	$9

1/2" SHANK

PART NO.	D	PRICE
C1074	1/2	$7
C1076	3/4	$9
C1077	1	$12

COVE



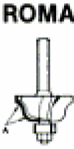
1/4" SHANK

PART NO.	A	PRICE
C1138	1/16 R	$12
C1139	1/8 R	$12
C1140	3/16 R	$12
C1141	1/4 R	$13
C1142	5/16 R	$14
C1143	3/8 R	$15
C1144	1/2 R	$16

1/2" SHANK

PART NO.	A	PRICE
C1149	1/2 R	$16
C1151	3/4 R	$28

ROMAN OGEE



1/4" SHANK

PART NO.	A	PRICE
C1153	5/32 R	$16
C1154	1/4 R	$18

1/2" SHANK

PART NO.	A	PRICE
C1155	5/32 R	$16
C1156	1/4 R	$18

VISA **ORDER TOLL FREE 1-800-235-0272** MasterCard

CIRCLE NO. 5 ON READER SERVICE CARD

Here's your Help!

MOBILE BASES
1. Models available for any machine

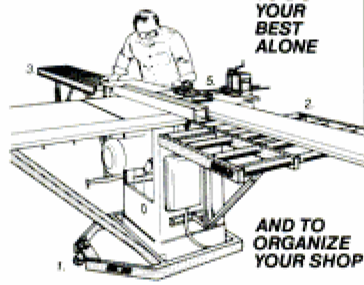
WORK SUPPORTS
2. OUTFEED ROLLERS fold neatly to save space

3. ROLLERTABLE Height adjustable, collapsible

4. PEDESTAL ROLLER Height adjustable, collapsible

5. SAW GUARDS for Table saws and Band Saw provide ultimate protection.

TO DO YOUR BEST ALONE



AND TO ORGANIZE YOUR SHOP WITH EASE

HTC PRODUCTS, INC.
120 E. HUDSON, ROYAL OAK, MICHIGAN 48067

FREE CATALOG! CALL 800-624-2027/(313)399-6185, ext. 150

CIRCLE NO. 10 ON READER SERVICE CARD

WOOD PARTS FROM MIDWEST DOWEL WORKS

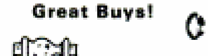
Compare Our Low Prices!

		Qty.	Cost
3-1/2" Poplar Shaker Peg	$15/100	___	___
1-3/4" Mini Shaker Peg	$7/100	___	___
3-1/2" Country Wall/ Mug Peg	$15/100	___	___
2-1/2" Country Shorty Peg	$12/100	___	___
Large Bean Pot Candle Cup	$17/100	___	___
Brass Inserts	$9/100	___	___
1/2" Mini Candle Cup	$10/100	___	___
1-1/2" Toy Wheel	$10/100	___	___
2" Toy Wheel	$17/100	___	___
Axel Pegs	$4/100	___	___

SMOOTH SANDED HEARTS

3/4"x1/8" Hearts	$2.75/100	___	___
3/4"x1/2" Hearts	$4.50/100	___	___
1"x3/16" Hearts	$6/100	___	___
1"x3/8" Hearts	$7/100	___	___
1-3/8"x1/8" Hearts	$7/100	___	___
1-3/8"x1/4" Hearts	$8/100	___	___
1-3/8"x1/2" Hearts	$10/100	___	___
2"x1/2" Hearts	$18/100	___	___

Great Buys!



		Qty.	Cost
3/8"x36" Standard Dowels	$21/100	___	___
3/4"x36" Oak Dowels	$15/10	___	___
3/8" Maple Buttons	$2.15/100	___	___
1/2" Maple Buttons	$2.25/100	___	___
1-1/2" Maple Spindles	$9/100	___	___
2-1/8" Maple Spindles	$18/100	___	___

ORDER NOW

☐ MC/Visa ☐ Check Enclosed

Total Cost ________

Handling $3.00

Ohio residents add 5½% sales tax ________

Final Cost ________

MC/Visa Number ________

Expires ________ Phone ________

Name ________

Address ________

City/State/Zip ________

FREE 16-PAGE CATALOGUE

Circle this section for FREE Dowels – mixed pack, Maple, Oak, Walnut Cherry, from 1/4" up to 1" Approximately 10 LFT. 14" long. $5.00 value with any order.

MIDWEST DOWEL WORKS

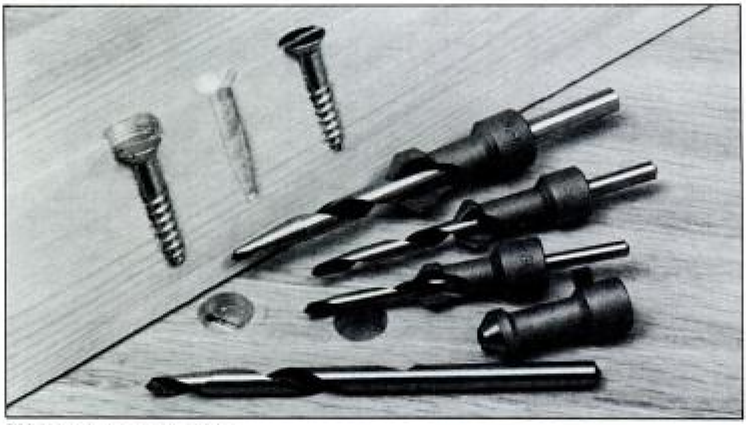
4631 Hutchinson Road
Cincinnati, Ohio 45248
(513) 574-8488

Same Day Service/Order before Noon
Factory Direct/Satisfaction Guaranteed

A New Twist ▶

For a screw to have maximum binding power, the screw hole should be tapered like the screw entering it. In the past, tapered bits have been expensive, but Leichtung now sells an affordable four-piece set. These bits come in four commonly used sizes: #6, #8, #10 and #12. These drill bits come complete with countersinks which require only a screwdriver—instead of the ever-elusive Allen wrench—to adjust them. (Price: $19.99)

■ *Leichtung Workshops, Dept. AWT, 4944 Commerce Pkwy., Cleveland, OH 44128, (216) 831-6191.*



CIRCLE NO. 30 ON READER SERVICE CARD

SHOP TEST

Stabilax: Take the Shrew Out of Your Skew

One of the toughest tools for a turner to master is the skew. Used properly, the results are fast and magnificent —the tool can even be fun. In the best of hands, however, the tool can bite unmercifully, marring your work. Many accomplished woodworkers are afraid of the skew and tend not to trust themselves with it. This is a shame, because properly used, the skew saves time and yields crisp, finely detailed turnings.

Now there is a simple device that tames the meanest of skews in the klutziest of hands. The "Stabilax" is a cylindrical weight that slides onto the shaft of a skew and locks in place with a hex screw.

I was first introduced to the device at last year's Los Angeles Woodworking Show. Richard Lukes, the inventor of the Stabilax visited my booth and offered me one of these items to try. I was busy at the time, but with the first lull in traffic, my wife Susan asked me to give the Stabilax a try. I told her, "Ah, that's just another gimmick! Throw it in my tool bag and I'll try it someday," (which meant never).

Things were slow that Sunday, so Susan resurrected the sample from my bag and said, "Really now, why don't you give it a try?" So I gave in and decided to try it. I was very skeptical. The first few straight cuts didn't really seem all that different from a plain old skew. The real eye-opener came when I cut some beads. I was truly amazed. I proceeded to cut in a manner that would invite a catch, and really had to work to get one. In the end, I was clowning around resting my elbow on the head stock while turning with one hand. In short, I was blown away by Stabilax.

Our children Genoa, 10, and Justin, 8, were at the show with us. I pressed them into service to further test Stabilax. They have been turning for some time but not yet with the skew. With Stabilax, they took to the skew like ducks to water. They thought it was fun and had no idea that a skew could be hard to use.

Why Stabilax Works

The reason a normal skew chisel is so difficult to use is that the tool is unbalanced. There's often no support directly under the downward force at the point of cut. Stabilax, as the name implies, changes all of this. It gives a skew support directly under the point of cut, and because it is cylindrical, it's easy to roll the tool on the rest.

The virtues of Stabilax don't end with the skew. You can also mount Stabilax onto your scraper.

My conclusions are that for the accomplished turner, some time with Stabilax will bring you a better understanding of the dynamics of how a skew works, and make you a better turner. For all others, the device is a must-have. It takes the fear out of using a skew, and whether you decide to bolt Stabilax on your skew forever or use it as a stepping stone, is really a matter of personal choice.

The Stablilax comes in two sizes: 1¼-in. and 1½-in., and both cost $24.95. The 1¼-in. size is probably the most useful. They may be ordered from Beech Street Tool Works, 440 Beech St., Los Angeles, CA 90065. Be sure to add $3.50 per unit for shipping and handling. (California residents add 6½% sales tax.)

ERNIE CONOVER

CIRCLE NO. 29 ON READER SERVICE CARD

Rotocator ▶

If your planer is leaving tracks in your wood—end snipes, chattering, non-parallel surfaces—maybe it's time to give it a tuneup. The Rotocator is a simple gauge that will make tuning up your planer a simple and accurate job. The Rotocator helps you to adjust: 1. The planer bed parallel with the planer knives, 2. The bed rollers, 3. The in-feed and out-feed rollers and chip breaker. Accurate to .002 in., the Rotocator has a magnetic base, so whether right-side-up or upside-down, it won't slip. The Rotocator works on any planer. (Price: $159.90)

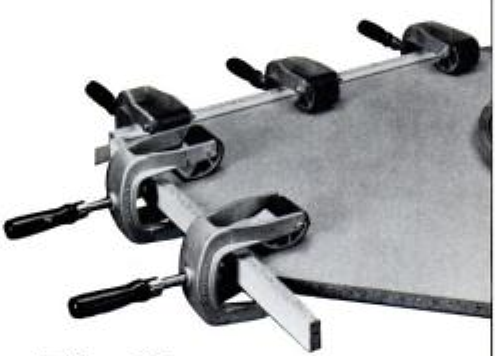
■ *Available from Uniquest Corp., Dept. AWT, 585 W. 3900 South #6, Murray, UT 84123, (800-331-1748).*

CIRCLE NO. 31 ON READER SERVICE CARD

◀*Makita Portable Planer*

Portable planers brought planing capability to legions of woodworkers on a budget. Now Makita has an entry in this field. The Makita Model 2012 compact planer is a good balance of capacity (it'll handle stock up to 12 in. wide and 6 in. high) and weight (52.8 lbs). The automatic-feed rollers pull stock through at 26.2 ft. a minute, past a two-blade cutterhead rotating at 8,000 RPM. The maximum depth-of-cut ranges from 3/64 in. to 3/32 in. depending on stock width. The 120-volt motor draws a healthy 12 amps. Disposable, double-edge planer blades are easy to change. An optional dust-collector hood and support stand are available. (Price: $885)

■ *Makita USA, Inc., Dept. AWT, 14930 Northam St., La Mirada, CA 90638, (714) 522-8088.*



Edge Clamp ▲

Gluing on edge banding can be a tricky task—especially if the edge is curved. Adwood's heavy-duty edge clamp makes edge banding a piece of cake. Its unique design features auto-tightening jaws, which enable you to tighten the clamp with one hand. The cast-iron jaws are protected with soft rubber, so there's no slipping and no marring your work. Good for both straight or concave/convex curve edge banding. These clamps accommodate panels from 3/8-in. to 3 1/8-in. thick. (Price: $79.00)

■ *Adwood Corp., Dept AWT, P.O. Box 1195, High Point, NC 27261, (919-884-1846).*

CIRCLE NO. 28 ON READER SERVICE CARD

Contour Sanders ▲

Sanding a piece of furniture can become an exercise in frustration when it comes to getting the hard-to-reach spots. Contour Sander blocks make sanding details a breeze. Simply wrap a piece of sandpaper around the convex/concave edge of the block, and your ready to work. Made of flexible rubber, Contoured Sanders come in two sets. The concave set contains six sanders—four concave sanders (5/8-in., 1/2-in., 3/8-in., 1/4-in.), one flat surface sander, and one sanding pad. The convex set contains four convex sanders (5/8-in., 1/2-in., 3/8-in., and 1/4-in). (Price: concave set, $4.25; convex set, $2.95)

■ *The Woodworkers' Store, Dept. AWT, 21801 Industrial Blvd., Rogers, MN 55374, (612-428-2199).*

CIRCLE NO. 32 ON READER SERVICE CARD

SALLY SHENK ULLMAN   BIRD PHOTO BY VIREO

Whoever said birdhouses had to be rough and ready? This season you can give the birds something to really sing about.

BY ANDY BARNUM

TURNED BIRDHOUSES

Turning That's Strictly for the Birds

When a friend, and customer, asked me if I might be interested in building a few birdhouses for him, my first reaction was—Not really. But, he persisted. He wasn't after just any old birdhouse. He wanted me to reproduce a turned birdhouse that he had bought from an antique dealer. It wasn't until he brought this antique beauty out for me to see, that I changed my tune. It had a coopered body, a laminated roof and base, and spindle-turned finials. Decades of weather only added to its beauty. What a find!

Making the reproductions challenged my turning skills and my imagination. When I finished the copies, I tried my hand at birdhouse design, and I've been at it ever since.

In this article, I will explain the basic steps of building a turned birdhouse. Once you understand the process, try designing and building your own birdhouse. Come spring, you'll be hearing the grateful songs of many a winged resident.

To begin, choose your woods with an eye to the weather. Your birdhouse will need to withstand the elements. My earliest attempts were out of pine, but experience has shown me mahogany weathers well and makes a fine body, and cedar is a good choice for the roof. I now make many of my birdhouses for indoor settings—strictly ornamental—which allows me room to experiment with different kinds of wood. I like to make the finials and perches out of exotic woods. Generally, my birdhouses include a wide variety of woods. I do this as a sort of celebration of the special relationship between birds and trees.

I cooper the bodies of my birdhouses. It's the least wasteful way of making the body and an interesting technique to learn in itself. Coopering, however, may not appeal to every turner. There are alternative techniques that will produce a good body, for example, hollowing out a solid block on the lathe, or bandsawing a body out of a log, and then gluing the kerf shut. If you decide to cooper the body together, see the sidebar on Coopering, page 20.

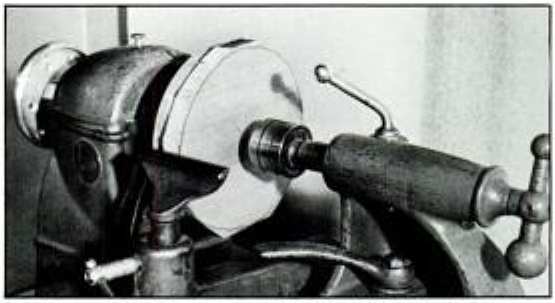
One word before you start working. Working on a lathe is a great pleasure—there's nothing quite like seeing your work take shape before your eyes. But, don't get so carried away that you forget to wear face protection, and use common sense. A lathe can be dangerous, so take precautions.

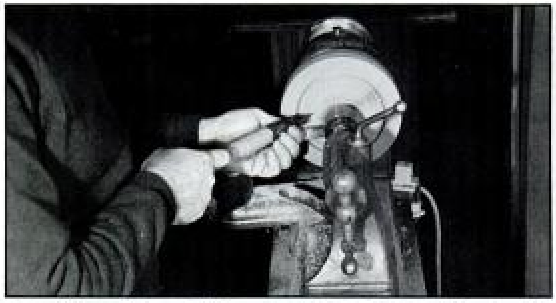
Building the Roof and Base

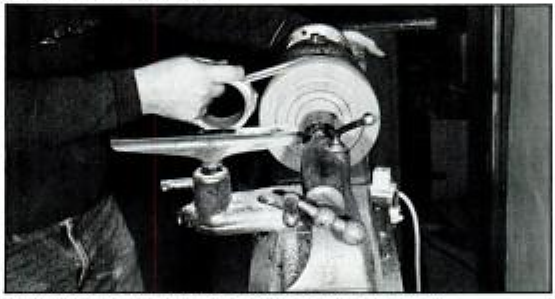
I've used several techniques for building the roof. My early efforts were simple stack laminations using 1½-in. stock, turned on the lathe. After that, I experimented with segmented rings (glued-together pie-shape pieces) to conceal end grain. Now I use a different method, in which I mount a piece of ¾-in. solid stock on the lathe and use a parting tool to cut a series of beveled rings out of the stock. I then glue these rings in a stack to form the roof. This may sound a little confusing, but between the photos and explanation, it should all become clear. I find stacking beveled rings to be the most economical use of materials and time, but feel free to experiment with other ways.

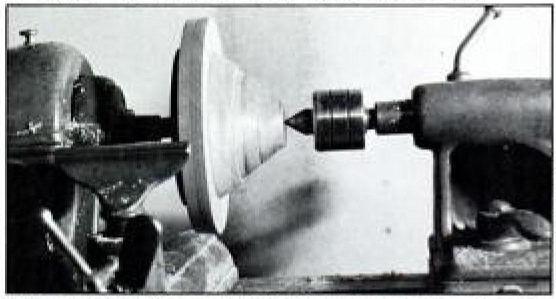
Start by sketching a full-scale, side view of your roof on graph paper. Then, directly above it, sketch a rectangle to represent your roof stock (before being separated into rings). Draw parallel lines upward from the roof drawing to the rectangle above to mark out where you will need to part off the rings to create the size roof you've chosen. Refer to Fig. 2, which illustrates the process.

Put a faceplate on the lathe with a waste block as


Mount your roof stock on the waste block, and hold it in place with the tail-stock center.


Part off the roof rings holding your parting tool at a consistent angle. It helps to shift back and forth between the cuts to do this.


If you find the outside ring is rattling as you turn, tape it to the waste block.


You can use your lathe as a clamp to glue up the roof. Be sure to center the rings before you tighten the tail stock.

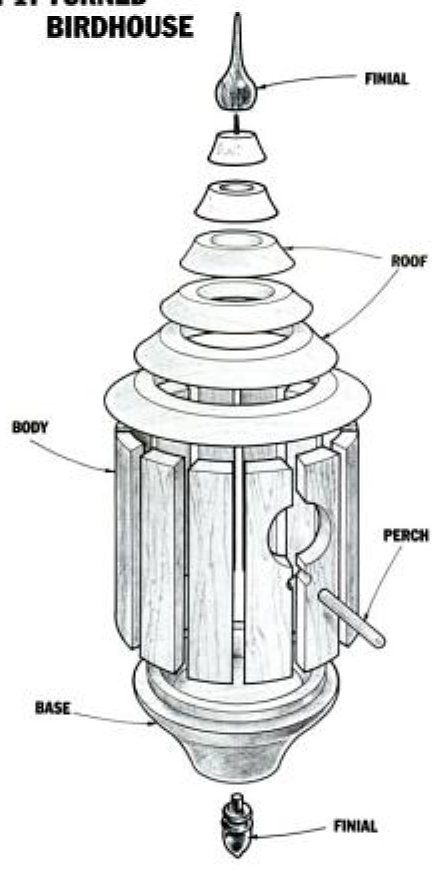
PHOTOS BY FIONA A. WILSON

wide in diameter as your roof stock. Round off the corners on your roof stock, and place it against the waste block. Next, press the tail center into the roof stock to create a friction drive. To help keep the roof stock from sliding around, I put three strips of Stik-It adhesive sandpaper on the waste block before I place the roof stock against it. (Stik-It is available from Constantine's, 2050 Eastchester Rd., Bronx, NY 10461, 800-223-8087.)

True up the stock, and mark out your cutting lines for the rings. Then, turn a rabbet as shown in Fig. 2—this is where the roof will fit over the body of the birdhouse. Next, part off the outer ring holding the parting tool at the angle shown in the cross section of your sketch. To part off the rings, I use a homemade 1/16-in. thick, high-speed steel parting tool that gives me a narrow cut. You can equally as well use a regular parting tool. As for the cut itself, I just eyeball the angle. After I've parted off the first ring, I part off the next two rings by alternating back and forth between cuts. In this way, I have a consistent angle, and then I cut these rings off at the last moment so they don't wobble as I work. You'll notice, as the rings come loose, they'll rattle around, but they won't actually come off because of the angle of the cut. You can tape the rings to the waste block to keep them from rattling.

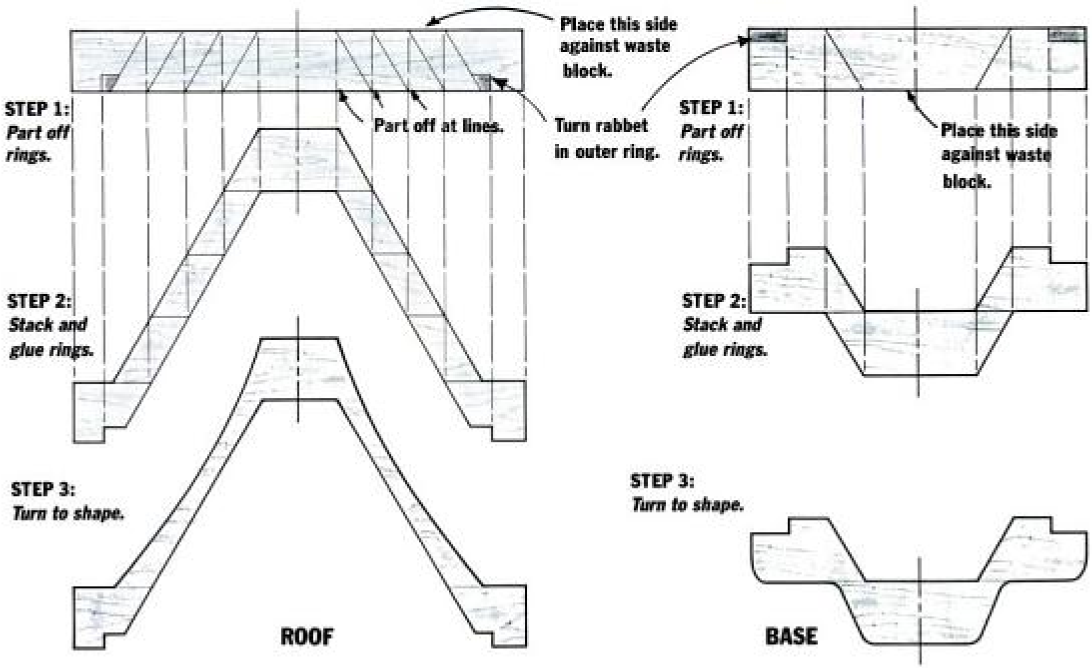
Next, you'll need to stack the rings and glue them together. I also do this on my lathe, using the tail stock as a clamp. (See photo.) To do this, remove the rings from the lathe, and briefly sand the glue surfaces of each ring. Then, back at the lathe, turn the waste block to the diameter that fits snugly within the rabbet you turned on the largest roof ring. Place the largest ring over this waste block, then glue and stack the rings up to the smallest top disc. Move the tail-stock center against this top disc, and tap the rings until they're aligned. Tighten the tail-stock center, and

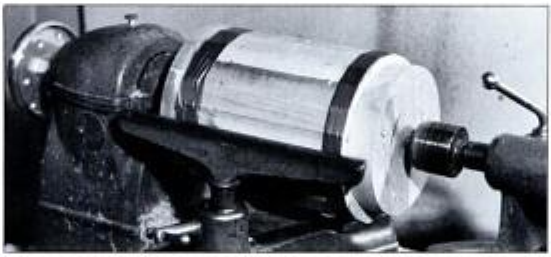
FIG. 1: TURNED BIRDHOUSE



DRAWINGS BY DAVID DANN

FIG. 2: CONSTRUCTING THE ROOF AND BASE





To turn the outside of the body, mount it between waste blocks, and tape up both ends as a safety precaution. Shift the tape to the center when turning the outer ends.

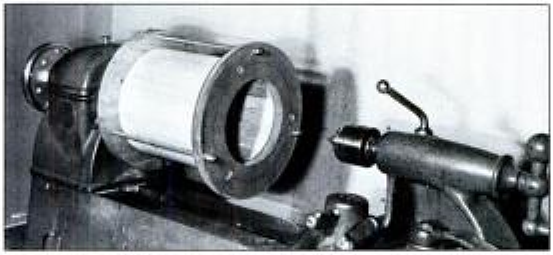
leave the assembly to dry. Turn and assemble the base using the same techniques as the roof. (See Fig. 2.)

Turning the Body

The coopered body can be turned between centers. Sandwich the body between waste blocks the same diameter as the body. Again, I place adhesive sandpaper near the outer edge of the waste blocks to keep the body from slipping. Center the body carefully, and turn it until it's a smooth cylinder. (See photo.)

My lathe didn't come with a shield, but if yours did, this would be a good place to use it. At the very least, wear a full-face, plexiglass shield. At least one birdhouse body has exploded on my lathe. Wrap strong tape around the ends while you turn the middle, and then tape the middle while turning the ends. Turn both ends of the body so they're equal in diameter. (If you plan to turn the inside, this will be important for remounting.) When you're finished, part in, but not through, at each end of the birdhouse to even up the ends of the cylinder. Finish up the cut with a saw.

Turning the inside of the body isn't really neces-

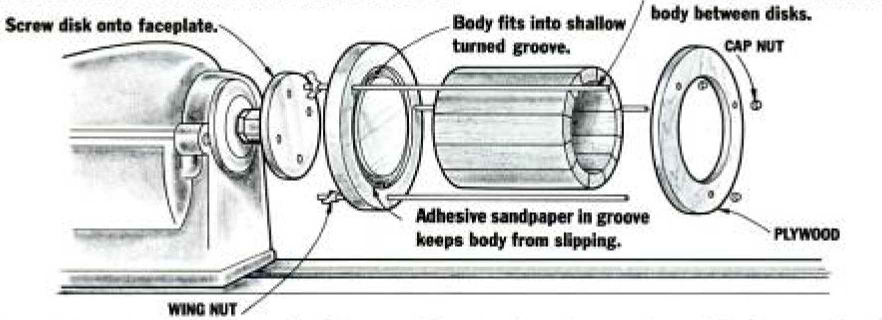


To turn the inside of the body, mount it within the chuck shown in Fig. 3.

Using a long scraper, turn the inside circumference of the body.

To turn the outside of the roof, mount the rabbet in the roof over a tight-fitting waste block. Be careful not to turn the roof so thin that you break through at the rabbet.

FIG. 3: CHUCK FOR TURNING INSIDE OF BODY



sary, but it is an interesting exercise in chucking—and allows a better fit between the body and the base. To turn the inside of the body, you'll need to make a chuck like the one shown in the photo and in Fig. 3. Then, with a heavy-duty scraper, turn the inside of the body.

Turning the Roof

Turning the roof is easy if you only turn the outside. (If you plan to turn the inside, too, do that before you turn the outside. See next paragraph.) To set up for turning the outside, use the same waste block that you used to glue up the roof—the one that fits the rabbet inside the roof. Secure the roof with the tail stock, and turn it so that the outside has a smooth curve. Avoid turning it too thin near the rabbet. Then, if you like, you can experiment with turning a shingle pattern.

Turning the inside is a little more challenging, and I won't go into this process in depth. Let me just mention that to do this, you'll need to secure the roof in a homemade cup chuck. (See Fig. 4.) Mine is made from wood end blocks and heavy-duty, fiber shipping tube such as a Sonotube—a paper-fiber construction tube

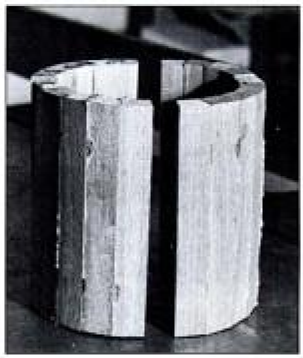
COOPERING

Coopering is the least wasteful way to construct the body of the birdhouse. Determining the number and angle of the staves takes a bit of math, but it's quite simple.

Decide the approximate outside diameter you want, and multiply by 3.14 to find the circumference. If you are making the house for a particular type of bird, refer to the chart on Dimensions of Nesting Boxes, which lists the types of birds that use birdhouses and the appropriate dimensions for each bird. Divide the circumference by the number of staves you wish to use, and you'll get the width of each stave. In other words:

Cut the staves for the body on a tablesaw. Make sure your fence doesn't have a gap at the bottom, because the outer edge of the bevel will catch under it. If there is a gap, make an auxiliary fence that is flush with the table.

When gluing up the birdhouse body, it's easiest to glue up two halves, then make any necessary adjustments on the remaining four edges with a plane.



OPTION 1:

Determing stave width when you know given body diameter:

Diameter × 3.14 = Circumference,
then Circumference ÷ # Staves = Stave Width

If you know what width of stave you want, and wish to work in the opposite direction, multiply your desired stave width times the number of staves to get the approximate circumference.

OPTION 2:

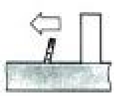
Determining diameter when you know stave width:

Stave Width × # Staves = Circumference
then Circumference ÷ 3.14 = Diameter

PERFECTING STAVE ANGLE

PROBLEM:
Staves meet on outside diameter, but gape on the inside.

SOLUTION:
Decrease angle of cut.



PROBLEM:
Staves meet on inside diameter, but gape on the outside.

SOLUTION:
Increase angle of cut.

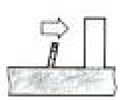
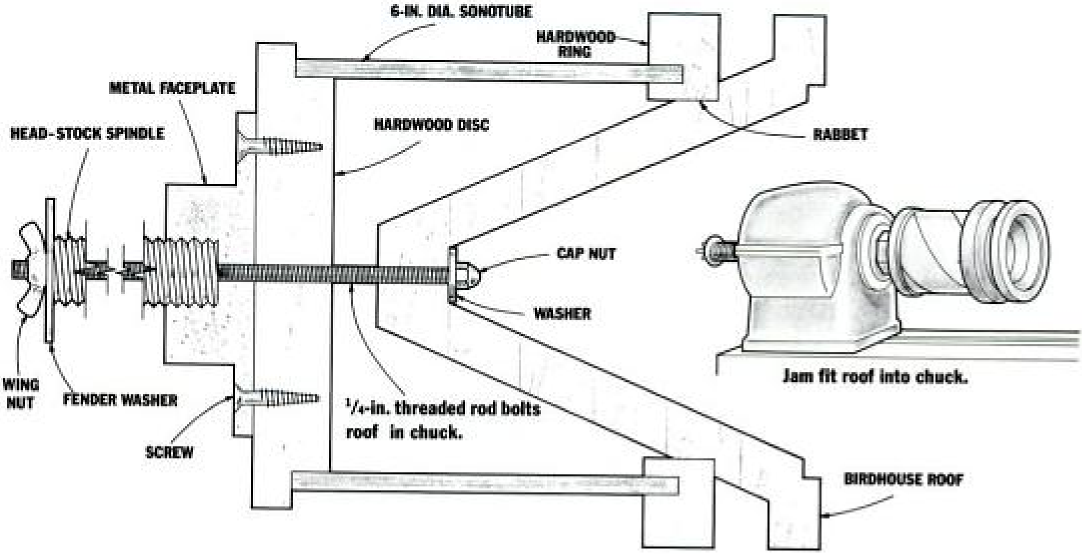


FIG. 4: CHUCK FOR TURNING INSIDE OF ROOF



Jam fit roof into chuck.

Finally, to determine the bevel angle on the staves divide 360° by the number of staves, then divide the answer by 2.

Determining the bevel angle:
(360° ÷ # Staves) ÷ 2 = Bevel Angle in Degrees

When you rip stave bevels on the tablesaw, add an auxiliary fence to close up any gap that you may have between your rip fence and your table. (This way the beveled edge of the stave will ride on and not underneath the fence.) It's a good idea to rip your stock oversize at first so you can adjust the bevel and recut the staves if necessary to fit. One technique for determining the exact bevel (since no saw is entirely accurate), is to cut a few extra staves out of scrap wood, then crosscut these into 2-in. lengths. Tape these together to form a circle—their fit will tell you how to adjust your blade angle. If the staves meet on the outside, but have gaps on the inside, decrease the angle of your blade tilt. If they meet on the inside, but have gaps on the outside, increase the angle of your blade. (See drawing.) Sometimes I get lucky and hit it on the first try. Other times endless fiddling fails to get the bevel perfect. Be sure to use a sharp blade that will give a clean joint. I use a Forrest 40-tooth combination blade, which renders a smooth cut (available from Forrest Manufacturing Co., 461 River Rd., Clifton, NJ 07014, 800-733-7111).

Once you've cut the staves, you're ready to glue up the body. Cradle clamps, mini pinch dogs, and tape will all work. I've found that big automotive hose clamps produce the tightest cylinders, and tape holds everything in place until the clamps are tight.

What if, despite your best efforts, all is not well? My considerable experience in this situation has revealed one good method of getting a gapless body. Using an even number of staves, leave two opposite points unglued, so when you remove the clamps, you're left with two glued-up half cylinders. (See photo.) Holding a straightedge across the halves will reveal how much to plane from each side. Finally, lay a sheet of sandpaper on a flat surface, and sand each half to a perfect fit. Glue the halves together and clamp overnight. —*A.B.*

Use the bottom of the plane as a leveling device to plane the halves to fit.

Glue up the staves using automotive hose clamps, one at each end.

SALLY SHENK ULLMAN

Once you make one birdhouse, explore working with different woods and dimensions.

—available at your local building-supply store. You will need to first turn a shallow rabbet in the outside of the roof, so that you have a flat surface to jam fit into the open end of the cup chuck. Run a draw bolt through the head-stock spindle and faceplate right through the top disk of the roof, and secure both ends with washers and nuts. (Use a cap nut for the end inside the roof and a wing nut for the other end.) Don't tighten this draw bolt too much, or you might tear the top of your roof right off. Position your tool rest inside the roof, and turn the surface carefully. Finally, remount, and turn the outside of the roof.

Finishing Touches

Turn the top and bottom finials and perch between centers to shape, leaving a tenon at the base of each for mounting in a Jacob's chuck to finish the top point.

Drill the entry hole to the diameter that matches the type of bird you hope to attract to your house. (See chart on Dimensions for Nesting Boxes.) Should you choose to make a landing shelf instead of a perch, rout out the edge detail you want on the shelf, and cut a slight curve in the back of the shelf so it conforms to the curve of the body.

Use waterproof glue on all pieces that will be used outdoors. I recommend a loose fit between the body and the base before glueup. You can then join them together with flexible silicone, which will allow the parts to move without cracking the coopered body.

Finally, apply a weatherproof finish to protect the birdhouse and its occupants from the elements.

DIMENSIONS OF BIRDHOUSES

Species	Floor of cavity	Depth of cavity	Entrance above floor	Dia. of entrance	Height above ground
	Inches	Inches	Inches	Inches	Feet
Bluebird	5 × 5	8	6	$1\frac{1}{2}$	5-10
Robin	6 × 8	8	A	A	6-15
Chickadee	4 × 4	8-10	6-8	$1\frac{1}{8}$	6-15
Titmouse	4 × 4	8-10	6-8	$1\frac{1}{4}$	6-15
Nuthatch	4 × 4	8-10	6-8	$1\frac{1}{4}$	12-20
House Wren	4 × 4	6-8	1-6	$1\frac{1}{4}$	6-10
Carolina Wren	4 × 4	6-8	1-6	$1\frac{1}{2}$	6-10
Violet Green Swallow	5 × 5	6	1-5	$1\frac{1}{2}$	10-15
Tree Swallow	5 × 5	6	1-5	$1\frac{1}{2}$	10-15
Barn Swallow	6 × 6	6	B	B	8-12
Purple Martin	6 × 6	6	1	$2\frac{1}{2}$	15-20
Song Sparrow	6 × 6	6	B	B	1-3
House Finch	6 × 6	6	4	2	8-12
Starling	6 × 6	16-18	14-16	2	10-25
Phoebe	6 × 6	6	A	A	8-12
Crested Flycatcher	6 × 6	8-10	6-8	2	8-20
Flicker	7 × 7	16-18	14-16	$2\frac{1}{2}$	6-20
Golden-Fronted Woodpecker	6 × 6	12-15	9-12	2	12-20
Red-Headed Woodpecker	6 × 6	12-15	9-12	2	12-20
Downy Woodpecker	4 × 4	8-10	6-8	$1\frac{1}{4}$	6-20
Hairy Woodpecker	6 × 6	12-15	9-12	$1\frac{1}{2}$	12-20
Screech Owl	8 × 8	12-15	9-12	3	10-30
Saw-Whet Owl	6 × 6	10-12	8-10	$2\frac{1}{2}$	12-20
Barn Owl	10-18	15-18	4	6	12-18
Sparrow Hawk	8 × 8	12-15	9-12	3	10-30
Wood Duck	10-18	10-24	12-16	4	10-20

A—one or more sides open. *B—all sides open.*

Reprinted with permission from: *101 Bird Houses, Feeders You Can Make* by Hi Sibley, The Goodheart-Willcox Co., Inc., 123 W. Taft Dr., South Holland, Ill., 60437, 800-323-0440.

Mounting the Birdhouse

The birdhouse can be mounted in numerous ways. If you add a small spacer strip in back, the same thickness as the birdhouse eave, you then simply screw the birdhouse to a wall (with the screw on the same level as the entry hole, so you can fasten the birdhouse to the wall with a long screwdriver.) Alternately, you could use a metal bracket system. You could even design a birdhouse in such a way that the house mounts on a pole.

Making my first turned birdhouse was a delightful task, but I got my biggest kick watching a bird move in hours after putting it up. I realized then that a birdhouse is actually small architecture for living occupants. This architecture must meet the needs of the residents, complement its surroundings, and with hope, bring a little joy to those who use it and those who view it. ▲

Andy Barnum is a professional turner in Carmel, New York. He is a founder and president of the Nutmeg Woodturners League. He makes birdhouses out of a love for nature, and a wish for a better relationship between humans and the environment.

BUYER'S GUIDE TO CARBIDE SAW BLADES

How to Pick a Quality Blade That's a Cut Above the Rest

BY JIM BARRETT

Today, carbide blades have all but replaced steel blades in the shops of most woodworkers. We've discovered for ourselves what saw-blade manufacturers have been telling us all along—carbide blades last 10 to 50 times longer than steel blades. In recent years, the story has become even brighter: manufacturers have been offering an increasingly wider variety of blade styles and price ranges. Thanks to technical advancements, and stiff competition in the marketplace, you can actually get more blade for your money today than ever before—a typical blade costs up to 30% less than the price of an equivalent blade 10 years ago.

All this good news is welcome, but selecting the best blade for your needs, and making sure you get what you pay for is not easy. When I began the research

There's a carbide blade for every type of cutting you want to do.

BLADES COURTESY OF: DELTA, SYSTEMATIC, FREUD, BLACK & DECKER, DML, ALLEN HARDWARE

SALLY SHENK ULLMAN

for this article, I soon realized that conducting a valid test on every blade available from every manufacturer would be a monumental task.

Instead, I tried a dozen or so representative blades from several major manufacturers, questioned their technical representatives, and added my own experience from a user's point of view. I found that you need to know only two things when buying carbide blades —which blade design will best suit your individual cutting needs, and how to spot a quality blade. Then, look in your wallet, and take it from there. Before talking about quality and price, let's look at the different kinds of blades and how they're made.

Blade Types for Different Jobs

Blades are designed for specific purposes according to the shape and geometry of the teeth. There are four basic tooth shapes, or grinds, shown in the photos and drawings of Fig. 1. These are flat top (FT), alternate top bevel (ATB), alternate top bevel with raker (ATB&R), and triple chip (TCG). Each grind was developed to make a particular kind of cut. The manufacturers also modify the teeth for specific jobs by altering the relief angles (hook, top relief, side relief, bevel angles) and the number of teeth on a blade. (See Fig. 2.)

Occasionally, you'll see an unconventional tooth design, such as a hollow, hooked, or V-shaped face or top grind, but for the most part manufacturers stick with the tooth grinds listed above, making minor refinements now and again to improve performance.

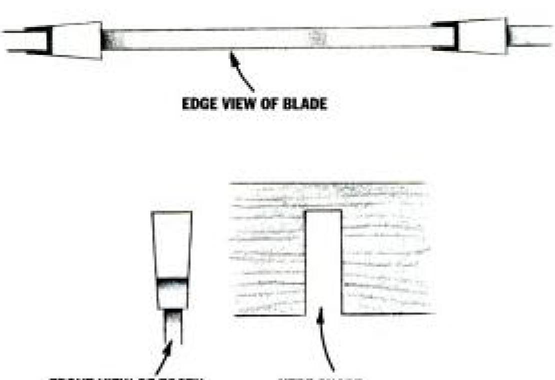
Flat-top grinds are found on 10- to 30-tooth rip blades, designed for fast, heavy-duty ripping of hardwoods and softwoods. The teeth are set into the plate at an aggressive 20° to 25° hook angle and separated by large gullets for fast chip removal. Flat-top blades cut with a chisel-like action, making them suitable for ripping only with the grain. On some blades, flat-top teeth are placed between other types of teeth, to act as "rakers" to clean out the chips. (See ATB&R below.)

Alternate top bevel teeth cut with a slicing or shearing action, like a knife; the steeper the bevel angle, the sharper and more fragile the tooth. Mild bevel angles (5° to 10°) are used in general purpose crosscut and combination blades. They won't crosscut as cleanly as teeth with higher bevels, but they stay sharp longer and are more stable in the cut. A bevel angle of 15° to

FIG. 1: CARBIDE-TOOTH GRINDS

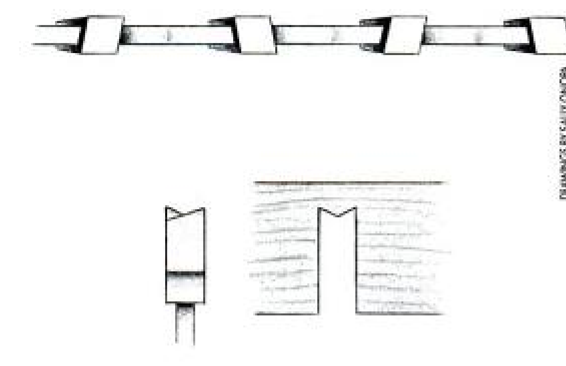
FLAT TOP GRIND (FTG).

For fast, heavy-duty ripping.



ALTERNATE TOP BEVEL (ATB).

Cuts with a shearing action, producing a smooth cut across the grain.



DRAWINGS BY SALLY ONOPA

PHOTOS BY TOM BARRETT

20° produces nearly splinter-free crosscuts in wood and plywood. Teeth with extremely steep bevel angles (30° to 40°) are used on specialty blades to eliminate bottom tear-out in fragile veneers and thin, double-sided laminates, such as melamine-coated fiberboard. One such blade is SysteMatic's "LV" (laminate and veneer) blade shown in the photo on page 24.

Alternate top bevel & raker blades come in several configurations. One type, called a 2 and 1 blade, has two alternating bevel teeth followed by a flat-top raker tooth to speed chip removal. A more popular design is the 4 and 1 "combination" or "planer-combo" blade with "sets" of four ATB teeth and one raker tooth, separated by a deep gullet. (10-in. blades typically have ten sets, or 50 teeth.) These combination blades come the closest to a "do-it-all" blade, making reasonably smooth, fast rips, crosscuts and miters in wood, plywood, and composition materials. Bear in mind that these combination blades are a compromise—they won't provide nearly as good a cut as a blade designed for a specific purpose.

A triple-chip grind consists of a chamfered tooth, which chips out the center of the kerf, followed by a flat-top raker to clean out both sides. A triple-chip blade is the most versatile when it comes to cutting a wide variety of materials: wood, plywood, particleboard, laminates, plastics, non-ferrous metals, and other man-made materials, such as Corian. These blades won't dull as quickly as ATB blades in hard, abrasive materials. Triple-chip blades aren't a good choice for crosscutting wood because they tend to splinter the bottom side of the cut.

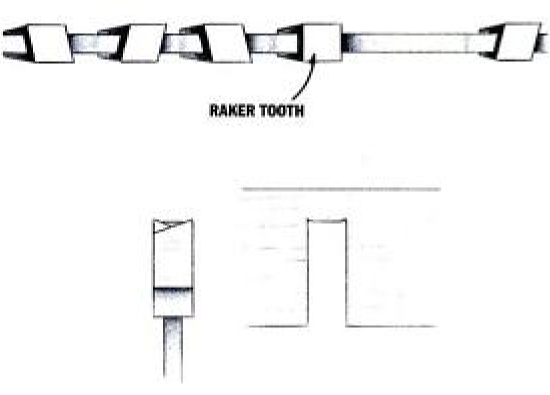
These four tooth grinds cover the vast majority of blades on the market. The angles of a tooth's face and sides also affect how it performs.

Relief angles are cut into the tooth geometry to provide clearance for the teeth in the cut. (See Fig. 2.) The *hook* or *rake* angle of a carbide tooth is determined by the angle it is set into the plate. The higher the hook angle, the faster, and rougher the blade cuts. Blades with lower hook angles cut smoother but require more feed pressure. Rip blades have an aggressive 20° hook angle. Combination blades (ATB&R), and general purpose ATB and TCG blades generally have a 15° hook; crosscut and trim blades a 10° hook.

The *side relief (radial) angle* is the bevel on the sides of the carbide teeth from top to bottom to prevent the sides from rubbing in the cut. On most blades the

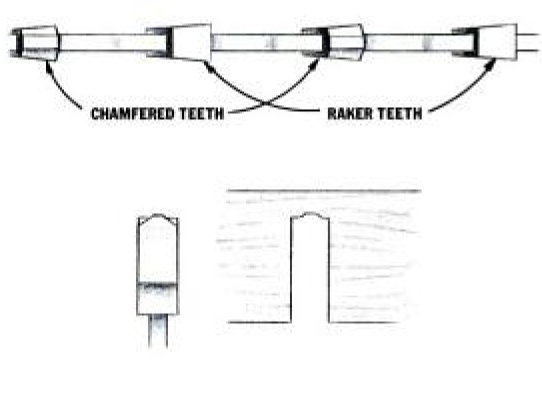
ALTERNATE TOP BEVEL WITH RAKER (ATB&R).

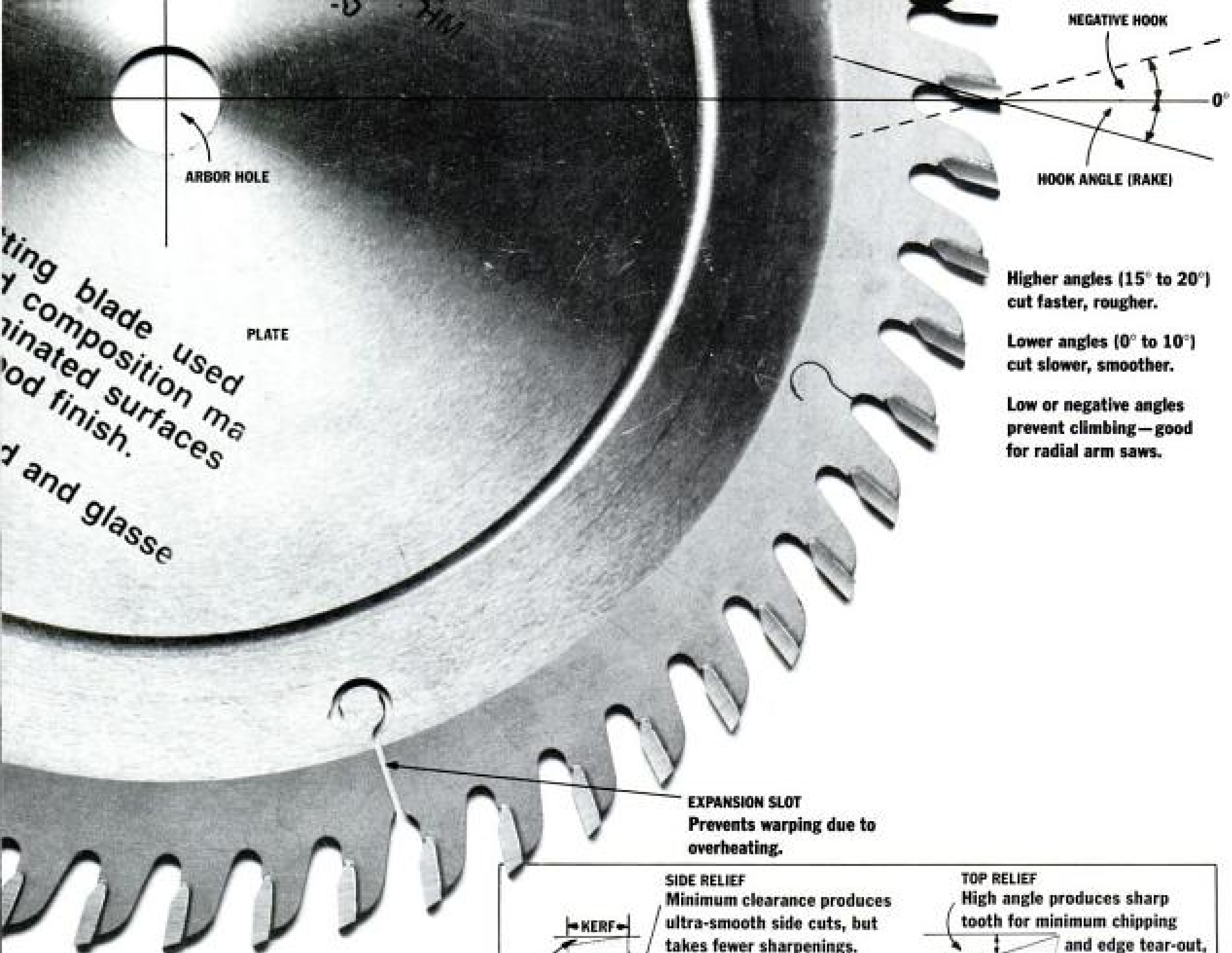
The best general purpose, or "combination" blade.

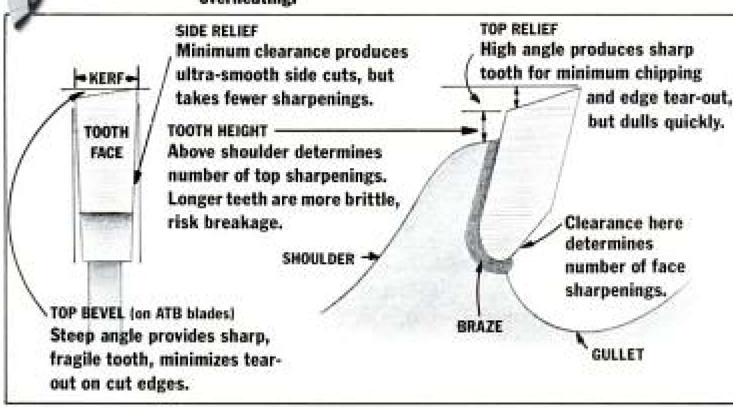


TRIPLE CHIP GRIND (TCG).

Most versatile tooth grind for a wide variety of wood and wood composition products, non-ferrous metals, and plastics.







BLADE COURTESY OF FREUD

FIG. 2: ANATOMY OF A CARBIDE BLADE

Manufacturers are always coming up with modifications to basic tooth grinds, such as this new "LV," ATB blade from SysteMatic. The high (30°) top-bevel angle is modified with a "dubbed hook" —the backward slant at the tip of the tooth—which eliminates chipping and tear-out on thin-veneer plywood and plastic laminate.

angle provides a clearance of about .010 in., give or take a few thousandths. Exceptions are ATB finish blades, such as Freud's LU85M, in which the side clearance is reduced to .001 or less. This minimum side clearance, combined with minimum clearance between the tooth sides and the plate, produces a nearly scratch-free side cut.

Other clearance angles are built into the tops and sides of the tooth to provide clearance in the cut. The top-relief, or top-clearance angle (front to back) of a tooth enables the cutting edge of the tooth to penetrate the wood. Most blades have a standard top angle of 10° to 15°. Likewise, the sides of the teeth are beveled front to back (tangential-relief angle) for the same reason.

Generally, the more teeth a blade has, the smoother it cuts. More teeth reduce the chip load on each tooth, so each takes a smaller bite, reducing chip-out. But more isn't always better. Most manufacturers suggest buying a blade with the fewest number of teeth to do the job at hand. The more teeth a blade has, the hotter it runs, the more feed pressure is required, and the more chips are produced, which can cause excess friction and shorter tooth life. This is why wood burns if you feed it too slowly through the saw. If quality of cut is more important than blade life, choose a toothier blade, and vice versa.

What to Look for in a Quality Blade

There's a wide range in the quality and cost of carbide saw blades available today. Later, I'll talk about three basic levels of quality and what prices to expect.

To pick the right blade within your budget, you'll first need to learn some of the materials and processes that go into producing a quality blade. I'll also give some tips for spotting signs of quality by inspecting the blade itself. Armed with this information, you can read the specifications in catalogs, and ask the right questions at retail stores. A 10× hand magnifying lens is great for getting a closeup look at blade details such as teeth brazing and the arbor hole.

The saw plate, or body is just as important as the carbide teeth for good cutting performance. The three factors to look for in a quality plate are hardness, tensioning, and flatness. The plate profile is cut out by stamping or laser cutting, then tempered to a specified hardness. A harder plate resists warping, bending, or buckling. A Rockwell hardness of 42Rc to 44Rc is an acceptable standard for high-quality blades.

Next, the plate is flattened by machine, then ground to final thickness and runout (wobble) tolerence. Hardness and flatness are more important than thickness. Blades with thicker plates tend to distort less but also require more power to run. Premium blades are finely ground, showing smooth, even, concentric grind marks from the arbor hole to the rim. Many "consumer" blades are painted, varnished, or sanded to hide grinding defects (or no grinding at all). On all but the cheapest 10-in. blades, manufacturers adhere to a maximum run-out tolerance of .0005 in. or less.

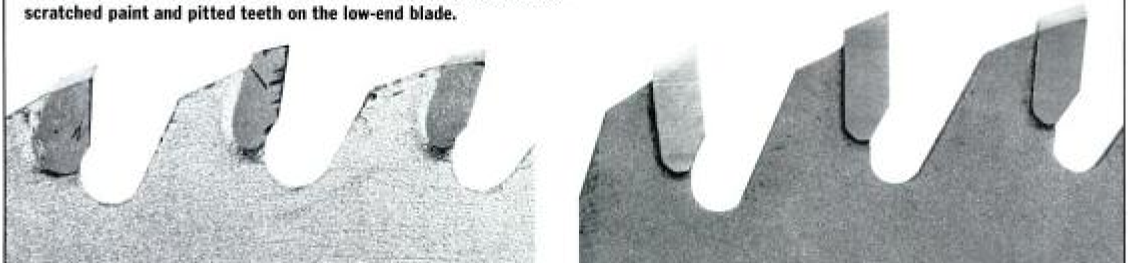
Tensioning involves relieving stresses in the plate so that it will expand and contract evenly during use, minimizing distortion. Some cheaper blades may not be tensioned at all, though most blades are at least roll-tensioned by machine. On better blades, the roll-tensioned plate is further inspected and "fine-tuned" by hammer tensioning.

On cheap blades, the arbor hole is stamped out (usually slightly oversize), and given no further treatment. On better blades, the arbor is stamped slightly undersize, then precision-reamed or ground to finer tolerances. If the hole has been stamped, one side will be bent inwards, the opposite side rough or burred. Grinding or reaming produces a more uniform hole, but this can be done hastily, resulting in burrs, scratches, or voids. An arbor hole with sharp, crisp edges and smooth sides is more likely to be perfectly round, centered, and fit snugly over the saw arbor.

Most blades 9 in. or larger in diameter have three or four .040-in. wide expansion slots ground into the plate to allow for even blade expansion during use. (See Fig. 2.) The slots usually terminate with a hole to prevent cracking. On some better-quality blades, the hole is plugged with a copper rivet to reduce blade noise. Laser-cut slots are a more recent innovation; some end in a fish-hook or anchor shape, rather than a hole.

The traditional carbide formula used for the saw teeth is fine-grained tungsten carbide particles mixed with a cobalt binder. The two powders are molded under heat and pressure into the solid shape of the saw-tooth blanks, which are brazed to the plate and ground to the desired tooth profile. Varying the proportions of the two materials determines carbide hardness, ranging from C-1 (soft and resilient) to C-4 (hard and brittle). Better carbide is not necessarily harder, but the carbide particles are finer, and the mixture more uniform in density, and less likely to

A closeup look at teeth reveals differences between a low-end blade (left), and a mid-range blade (right) from the same company. Note the scratched paint and pitted teeth on the low-end blade.

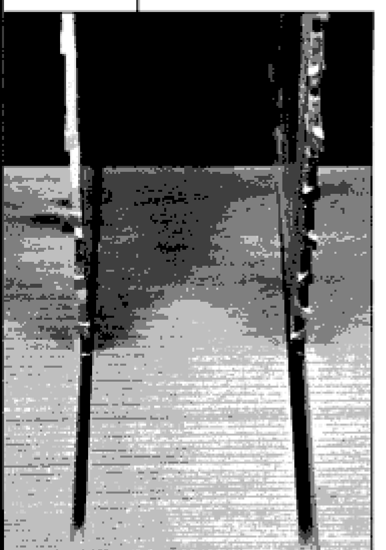


THIN-KERF BLADES

Thin-kerf blades have been around for years, but recently more saw-blade companies have been getting into the thin-kerf market, offering a wider variety of blade styles. Why choose a thin-kerf blade over a conventional-width blade? Manufacturers push the fact that these blades save material, which is true to a small degree. Most conventional-thickness blades cut a kerf about 1/8 to 3/16 in. wide; thin-kerf blades cut a kerf about half that width. But saving 1/16 in. to 3/32 in. of material on each cut is hardly a valid reason for buying a thin-kerf blade, unless you're making multiple cuts on an exotic hardwood or expensive veneered plywood. The photo shows the differences in width between a conventional blade and a thin-kerf blade. The main reason for buying thin kerf-blades is that they perform much better than conventional-width blades on a low-powered saw (1 1/2 HP or less). Because they remove less material, they require less power, and less feed pressure.

Because thin-kerf blades have thinner plates, they tend to deflect when used for cutting thick materials or at fast feed rates, which can result in a warped blade. Also, the teeth are smaller and will take fewer sharpenings. When shopping for thin-kerf blades, the qualities discussed in choosing a good blade are even more critical.

Thin-rim plywood and planer blades are a compromise between thin-kerf and conventional blades. Only the outer portion of the plate (near the perimeter) is ground thin, with the remainder of the plate (near the arbor hole) at conventional thickness to resist deflection. These blades are ground on one or both sides and fitted with narrow teeth to provide a thin kerf. Plates ground on both sides are usually more expensive (due to an extra manufacturing step to grind the second side) but tend to be more stable and balanced in the cut. On both thin-rim designs, the depth-of-cut is limited to the depth of the thin portion of the rim.—*J.B.*



Most conventional blades cut a kerf about 1/8-in. wide. A thin-kerf blade makes a kerf only about half that wide.

fracture or chip. Lower-quality carbide mixtures often contain voids, which show up as pits, fractures, or chipped edges on the ground teeth. You can sometimes spot these defects with a hand lens.

Hard C4 carbides are used for cutting brittle or abrasive materials, such as particleboard and high-pressure plastic laminates; softer C2 or C3 carbides for cutting wood. Because harder carbides are more brittle, you need to take extra care in handling the blades to avoid chipping the teeth (compared to steel blades, all carbide teeth are brittle and will chip or break if mishandled).

Two manufacturers have recently come up with "new-generation" carbide formulas, which they claim will last up to ten times longer than high-grade conventional carbide formulas. One is "Dyanite," a proprietary formula used in DML's Golden Eagle line; the other is a new formula from Freud, dubbed "HOOK." According to Leroy Bell at DML, Dyanite includes additives that break down the tungsten carbide particles to produce an extremely dense, fine-grained carbide mixture. Jim Brewer at Freud explained that the HOOK formula includes elements that make the carbide highly resistant to wood acids and other chemically abrasive materials. Brewer notes that in conventional carbide formulas, wood acids and heat can actually do more damage to carbide than physical abrasion. Dyanite, also, is claimed to be less vulnerable to wood acidity and heat buildup. The Dyanite and HOOK blades I tried ranked among the best in terms of cutting performance and overall quality, but it will be several years before I'll know just how much longer the teeth will last. (As an aside, you can extend the life of any carbide blade by keeping it clean—removing the acid-laden gummy deposits with kerosene or oven cleaner.)

Manufacturers braze the tooth blanks into pockets cut in the saw plate. Quality control really counts here. Check the blade for smooth, uniform brazes on each tooth. Poor brazing often shows tiny bubbles or pock marks. On some blades, the brazes are often ground smooth or sanded for cosmetic purposes. On cheaper blades, the brazes (and plate) may be covered with a coat of spray paint to hide blemishes.

After brazing, the teeth are ground and sharpened on diamond abrasive wheels. On more expensive blades, the top and face surfaces of the teeth are wet-ground with finer-grit wheels to produce an extremely sharp cutting edge and smooth faces. The sides of the teeth are usually ground with a coarser grit. On cheaper blades, only the top and face surfaces of the teeth are ground, usually with a coarser grit wheel, and the sides not ground at all. You can examine the teeth's cutting edges under magnification for coarse grind marks and rough or chipped edges. A dull grey, slightly granular appearance indicates that the surface wasn't ground at all.

The more expensive blades generally have larger carbide tips, so they'll take more sharpenings, but there's a trade-off. Blades with bigger teeth require more motor power, and more feed pressure, which can tire the operator. When feeding by hand, such blades may actually cut faster and smoother after several good sharpenings, as do thin kerf blades with their narrow teeth. Also, longer teeth are more prone to breakage, but the teeth must have enough material to take more than one or two sharpenings.

Quality and Price

Now that you understand the different types of blades and how they're made, let's look at how blades are categorized in the marketplace. I found that carbide blades fall into three general price categories, which I arbitrarily call *low end, mid-priced and high end*. Within the industry, low-end blades are sometimes referred to as "economy," "consumer," "DIY" or "throwaway" blades, although you won't see these terms used in catalogs or on saw-blade packages. Mid-priced blades are often labeled "professional," "contractor," or "semi-industrial" blades, and the high-end blades "industrial" or "premium." Such terms aren't used consistently from one saw company to the next, so they're only good as a general guideline.

Price is a better indication of quality. Generally, list prices for "low-end" blades run between $30 to $40 for a 10-in. blade; "mid-priced" blades, $50 to $90, and "high-end" blades, $100 to $200 and up. (Typically, the more teeth a blade has, the more expensive it is, within any given line.)

Low-end saw blades are designed for the weekend warrior interested in a low-cost blade that will outlast steel blades, but isn't picky about the quality of cut. I wouldn't equip my tablesaw with one of these blades. But, I regularly use the smaller-diameter versions in my portable circular saw for framing and rough cutoff work, because it gives a lot more cut for the buck over steel blades.

In my opinion, the mid-priced professional blades, represent the best buy for serious home woodworkers and small cabinet shops. These include the Black & Decker "industrial" line (made by Wisconsin Knife Works), the Delta carbide blade line, DML D-series blades, Forrest's Woodworker I and II blades, Freud's LU series, and "stock" blade lines from General Saw Corp. and SystiMatic. This is the broadest category in price and quality, and also tends to have the most new offerings and competitive pricing. Blades at the high end of the category ($80 to $90) approach industrial quality in performance and durability.

The high-end, or industrial, category is mainly custom blades made for high-horsepower, specialized industrial machines. These blades are designed for long life in continuous-use and power-feed applications. Most home woodworkers and small shop owners won't notice any significant difference in cut quality between these high-end blades and the better mid-priced blades on an average 10-in. tablesaw.

It pays to shop around for the best price on carbide saw blades. Manufacturers, mail-order houses, and retail outlets often run promotional specials, or offer discounts on entire lines—especially in the mid-priced blade category, which is where you generally get the best cut for your money, anyway.

Putting it all together. When choosing a blade, consider the type and number of projects you do (are you running your saw every day or just on weekends), what types of saws you own, and what types of operations you perform on each saw. I'm a general woodworker, who relys on my tablesaw to rip, crosscut, and miter most anything: softwood lumber, fine hardwoods, plywood, particleboard, and, occasionally, plastic laminates. That's why I keep a 50-tooth ATB&R "combination" blade on it 90% of the time.

Although I own a dozen or so different kinds of blades, I find myself using the following blades most often: a 24-tooth FT rip blade (heavy ripping when speed is more important than a smooth cut), an 80-tooth ATB cutoff blade (for smooth, chip-free crosscuts in cabinet-grade hardwoods and plywoods) and a 60 tooth TCG (10° hook) blade for nearly chip-free cuts in particleboard, tempered hardboard, and plastic-laminated materials. The TCG blade also makes a respectable trim blade when cutting with the grain, and can also be used for glue-joint rips if you keep a fairly fast feed rate.

A 50-tooth ATB&R blade should be the first in your collection. Then, you can add others as needed to get quality cuts in different materials. If you build cabinets for a living, I'd recommend a combination plywood blade (8 ATB teeth plus one raker per set), which makes smoother cuts in these materials.

And remember, the blade is only half the story—the saw powering the blade is just as important. It doesn't make good sense to put an expensive blade on a cheap saw. I suggest you confine your shopping to blades in the $50 to $90 price range for conventional woodworking machines (10-in. tablesaw, radial arm saw, power miter saw). ▲

SOURCES

BLACK & DECKER
10 North Park Dr.
P.O. Box 798
Hunt Valley, MD 21030

DELTA INTERNATIONAL MACHINERY CORP.
246 Alpha Dr.
Pittsburgh, PA 15238

DML, INC.
(Vermont-American)
1350 S. 15th St.
Louisville, KY 40210

EVERLAST SAW & CARBIDE TOOLS, INC.
1404 Utica Ave.
Brooklyn, NY 11203

FORREST MFG. CO. INC.
461 River Rd.
Clifton, NJ 07014

FREUD USA, INC.
P.O. Box 7187
218 Feld Ave.
High Point, NC 27264

GENERAL SAW CORP.
20 Wood Ave.
Secaucus, NJ 07094

GREENLEE/ FOREST CITY
4455 Boeing Dr.
Rockford, IL 61109

LIETZ TOOLING SYSTEMS, INC.
U.S. N. 31 Hwy.
Charlevoix, MI 49720

STATE SAW & MACHINERY CO.
(formerly Winchester Carbide Saw Inc.)
2633 Papermill Rd.
Winchester, VA 22601

SYSTEMATIC COMPANY
12530 135th Ave. N.E.
Kirkland, WA 98034

U.S. SAW CO.
P.O. Box 1
Burt, NY 14028

Jim Barrett is a free-lance writer specializing in woodworking tools, and finishes. He collects antique tools and is restoring his Victorian home in Pacific Grove, California. He wrote about doweling jigs in the July/August, 1988 AW, and honing guides in the July/August, 1989 AW.

LAMINATED CUTTING

Hard Rock Maple With Ebony Trimmings

BY DAVID SLOAN

This maple cutting board is a simple project you can easily knock off in a weekend. It's pretty enough to show off for company and rock-solid functional for some serious, heavy-duty slicing or chopping. I designed it with a slot to hold a special slicing knife, but you could make a board without a knife slot in even less time.

The cutting board starts as 8/4 hard maple. If you don't have 8/4 maple, then 6/4 will do. The nice thing about this kind of woodworking is that dimensions aren't all that important. You can design as you go.

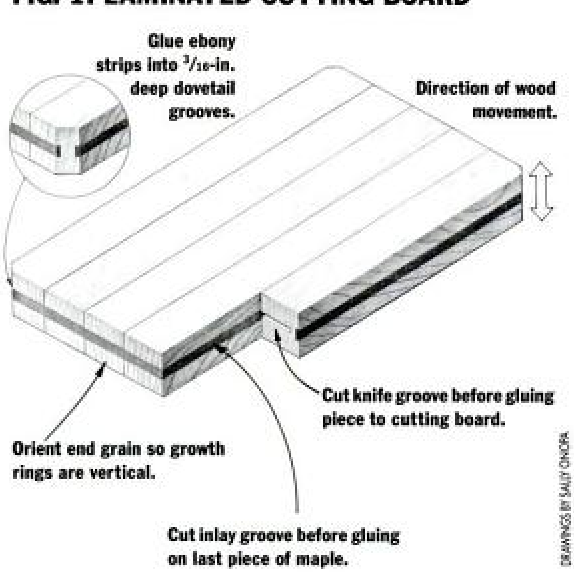
Even if you have a maple plank wide enough to make the cutting board in one piece, I suggest gluing up the cutting board from several pieces for three reasons: to minimize warpage, to minimize wood movement across the width of the cutting board, and to provide vertical grain on the top of the cutting board just for looks.

Crosscut your maple plank to length, then rip your maple into pieces that are roughly square in cross section. You'll need enough pieces to glue up the width of the cutting board. Square up two adjacent sides of each piece on the jointer or a hand plane, then square up the opposite sides by running the pieces through the thickness planer. If you don't have a planer, square up the sides on the tablesaw with a fine-tooth blade.

Orient the pieces so the growth rings on the end grain run vertically (see drawing), and you're ready for glueup. Because the cutting board will get wet, I glued up the pieces with epoxy. Epoxy is slippery, so make sure the pieces don't shift when you put on the clamps. If you're making a knife slot, don't glue on the last piece just yet.

While the glue is drying, prepare your dovetail inlay strips. I had some ebony lying around, so that's what I used. On the router table, cut a groove in a

FIG. 1: LAMINATED CUTTING BOARD



DRAWINGS BY SALLY ONOPA

BOARD

Glued up maple with ebony trimmings makes a handsome cutting board. Ebony strips fit into dovetail grooves and a slot in the side holds a knife.

PHOTOS BY JOHN HAMEL

piece of scrap with a 3/8-in. dovetail bit (available from Garrett Wade, 161 Ave. of the Americas, New York, NY 10013, 800-221-2942). Use this groove to test fit your inlay strips. Rip the inlay strips slightly oversize, and dovetail the strips with the dovetail router bit on the router table. Getting the right fit is a trial and error process, and expect to ruin a few strips. Because the strips are so narrow, I suggest using hold-downs to keep the strips against the router table and fence.

After you've squared up the sides, ends and faces of the cutting board, you're ready to cut the inlay groove with the 3/8-in. dovetail bit on the router table. On the side where the knife will go, rout a dovetail groove a little longer than the handle of your knife. Leave your router table set up as is. You'll come back to it in a minute. Glue in a piece of inlay strip, then trim and sand the surface smooth.

Cut the knife slot in the last piece of maple by making a stop cut on the tablesaw, and glue it onto the side of the cutting board. Square up the last piece to the rest of the block.

Rout the inlay groove all around, and glue in the inlay strips. As long as you've oriented the end grain of the maple pieces vertically, you don't need to worry about cross-grain construction, because most wood movement will occur across the *thickness* of the cutting board, parallel to the growth rings. (See drawing.)

The last bit of work is to nip off the corners of the cutting board at 45° on the tablesaw. I screwed a 45° fence to my sliding crosscut table and made the cut with an 80-tooth cutoff blade. After some sanding, apply a coat of mineral oil if you like, or leave the cutting board unfinished. ▲

David Sloan is Editor of AMERICAN WOODWORKER.

SALLY SHENK ULLMAN

Repetitive Cuts Are Secret to Success

BY BEN BACON

Repeat moldings are probably the most common kind of carving—they're used everywhere around us as embellishment on picture frames, furniture, and architectural moldings. These carved patterns transform smooth moldings into a richly detailed surface that gives life to any room or piece of furniture. The variety of patterns is immense and covers all styles and periods, from flowing acanthus leaves to classically elegant honeysuckle. Whatever the pattern, there's something thrilling about the fineness and regularity of repeat moldings. In this article, I'll demonstrate the steps that are used in carving two simple, universal patterns—a "lambs tongue" and a berry. Once you understand the procedure for carving these two patterns, it should be easy to apply the steps to any of the thousands and thousands of repeat-molding patterns that exist.

They're called repeat moldings because they do just that—repeat themselves. If you look closely at carved moldings, you'll notice that most patterns will repeat themselves over and over again. This makes carving repeat moldings quite different from carving something like a ball-and-claw foot, or a drawer shell, where there is little or no repetition, and where slight variations will probably be unnoticeable. Repeat moldings need to be uniform, precisely spaced, and regular. This isn't as tricky as it sounds. There are aids and methods of working that make the process much easier.

Repeat-molding patterns are carved on lengths of shaped moldings, and each traditional molding profile (ogee, astragal, etc.) has its own traditional patterns. However you make your moldings—with a shaper,

Repeat moldings are repetitive patterns carved into moldings on frames, furniture, and buildings. This picture frame has a berry pattern carved on the outside of the frame and a "lamb's tongue" pattern around the inside edge.

Carving Repeat Moldings

router, scratchstock, or carving tools—make sure that you have selected the right profile for the pattern you want. Also, make sure that the profiles of all the lengths of moldings are the same, so that when mitered, the molding runs smoothly together at the corners.

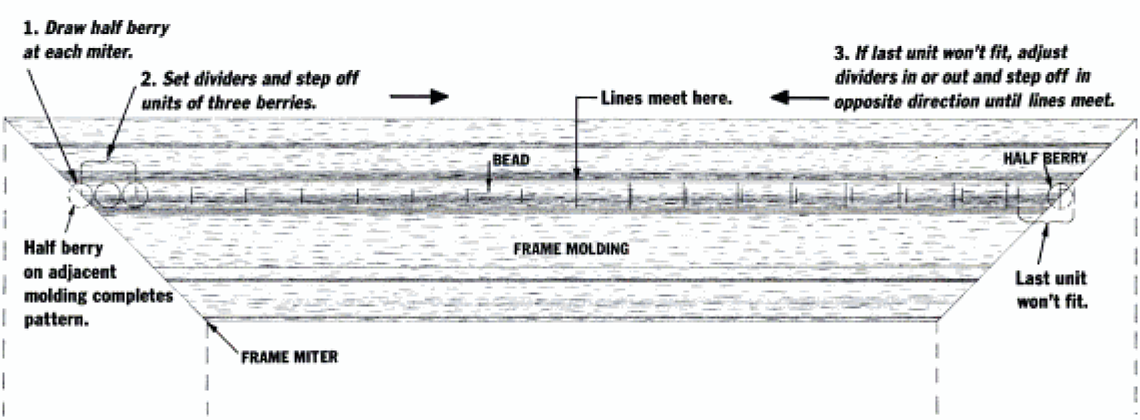
The molding shown in the photos and drawings is a French Louis XVI baguette molding, most often used for small picture frames. This style of molding would usually be gilded, but the molding is so pleasant that it looks good with a clear finish, too. The molding I'm carving in the photos is made of clear, straight-grained mahogany.

Mitering the Molding

After the molding was shaped, I mitered it to size before carving. The painting that I wanted to frame is 18 in. × 14 in. overall (called the *canvas size* or *picture size*), and I wanted the frame to overlap the picture ½ in. all around. Subtracting 1 in. from the overall size gave me a measurement of 17 in. × 13 in. for the frame opening. This measurement is known as the

Mark out a half berry at either end of the molding, and divide the space between into groups of three berries. Then, go back and mark the center of each individual berry.

FIG. 1: MARKING OUT REPEAT PATTERNS



The first step to carving the berries is to make a V-cut between the berries with a parting tool.

Round the berries by holding the gouge bevel up with the handle low and in line with the molded bead. Raise the handle, rounding the berry as you go. Finish with the handle in an upright position.

sight size, because it is the size of the picture that you will actually see. The sight size is the critical measurement when cutting miters.

First, cut the left-hand miter on each of your four pieces of wood, then mark off your sight size on the inside edge of the molding. Swing your miter saw around, and cut the other miter just up to your pencil line. Now take your two long sides and your two short sides, and hold the short against the short and the long against the long to make sure that they are exactly the same length. If they aren't, the frame will be twisted or the miters will gape. Don't put the frame together yet—it's easier to carve moldings when they're apart.

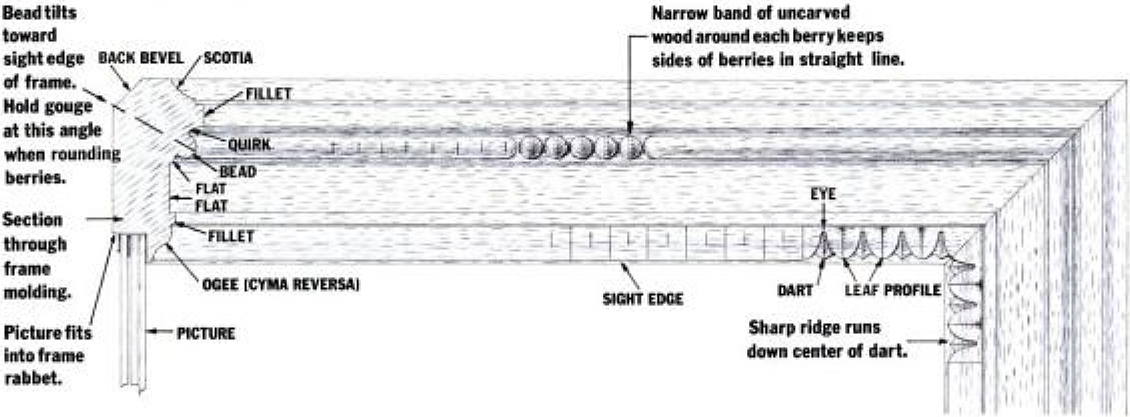
Marking Out the Berry Pattern

Now for marking out the berry pattern. It's necessary to do all your mitering or cabinet work first, because the pattern needs to be fitted exactly into the available space, and because, quite often, patterns will have more elaborate ornamentation in the miters. You need to plan for this from the very beginning. The first and most important step is to lay out the pattern. So, mark out half a berry on each miter. (The other half will be formed by the adjoining molding.) Now that the pattern is set on each miter, it's time to fill in the space between.

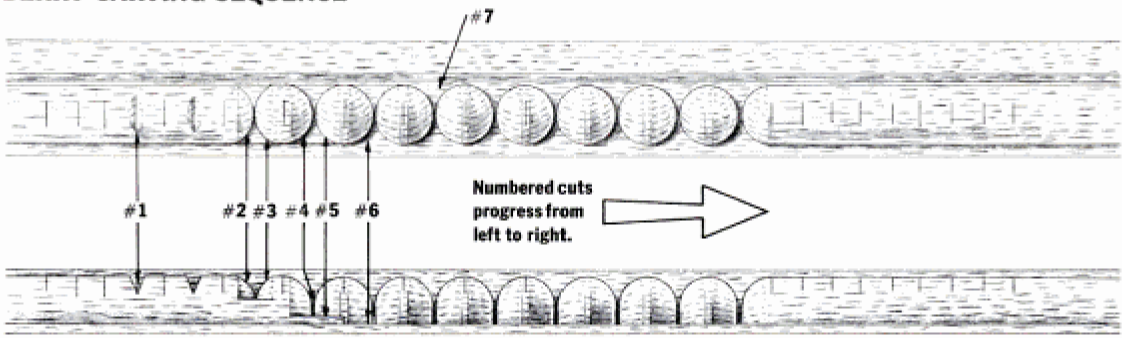
To evenly space patterns, use dividers, rather than a ruler. First, mark out the length of three berries, and set your dividers to this measurement. Starting from the half berry that you've already marked out on the miter, very gently (so that you don't mar the wood) measure out units of three berries along the entire length of the molding. Ordinarily, you'd mark the area *between* the berries rather than the berries themselves so that you cut out your pencil marks. But, if this is the first time you've carved a molding, it will be easier to mark the center of the berry itself and erase the pencil mark when you're done.

If you're lucky, when you reach the opposite end of the molding, the dividers will fall exactly on the center of the other half berry that you've marked. If not, shorten or lengthen the dividers a tiny bit, and this time, start from the center of the half berry at the

FIG. 2: FRAME MOLDING WITH LAMB'S TONGUE AND BERRRY PATTERN



BERRY-CARVING SEQUENCE



opposite end of the molding, and work your way back toward the first, as shown in Fig. 1. This process of working in from one miter with dividers, adjusting the spacing a tiny bit, and working back until your lines meet, is the procedure that is always used to lay out repeat moldings so that they begin and end where you want them to.

At last, your molding is precisely laid out with units of three berries. Now, either by eye, or with the dividers, find the center of each individual berry within the groups of three, and make a pencil mark,as shown in the photo.

If a molding is small, with a fairly large rabbet for the picture, you can hold it down for carving by clamping it in a big bench vise, gripping it by the rabbet and the flat, back edge. Only do this if both clamping surfaces are big enough. Otherwise, you can clamp the moldings down onto the bench, though sometimes the clamps get in your way. If they do, saw a piece of wood that fits the rabbet, nail or screw it to your bench, and push the molding up against it. This piece of wood is also useful for supporting the sight edge of the frame (the edge that forms the picture opening) when you carve it, as shown in the photo on page 33. This is especially useful if the sight edge is thin, running the risk of breaking it while carving. Pieces of wood nailed tightly behind the molding and at the two miters will hold it firmly in place.

Carving the Berry Pattern

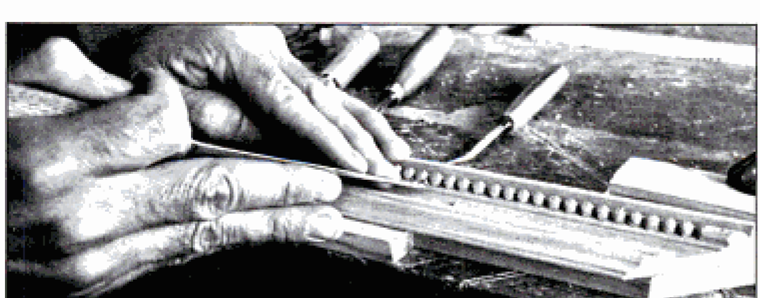
The trick to getting a good-looking molding is to use sharp tools and use them decisively. Make each cut only once, and make sure it's in the right place. If you try to redo the cut, or use sandpaper to even it up, the molding will lose its crispness and regularity.

Now for the carving. Start with the berries, because they're the easier of the two moldings to carve. The sequence of cuts is shown in the drawing above. The cut numbers in the text that follows refer to the cut numbers on the drawing. Many, but not all, of the steps are also shown in the accompanying photos. If you haven't carved this molding before, it's best to practice on a bit of scrap. Professional carvers will almost always practice on scrap in order to pick the right tools for the pattern and to completely work out the pattern and the sequence of cuts.

You'll need four tools for carving the berries: a 6mm parting tool, a gouge which exactly fits the profile of the bead (I used a 5mm, #6), an 8mm, #5 fishtail gouge for cleaning out the waste, and a little pick, a tiny tool no more than 1mm across, used for picking out waste in tight spaces. (For more on carving tools, see November/December, 1988 *AW*.)

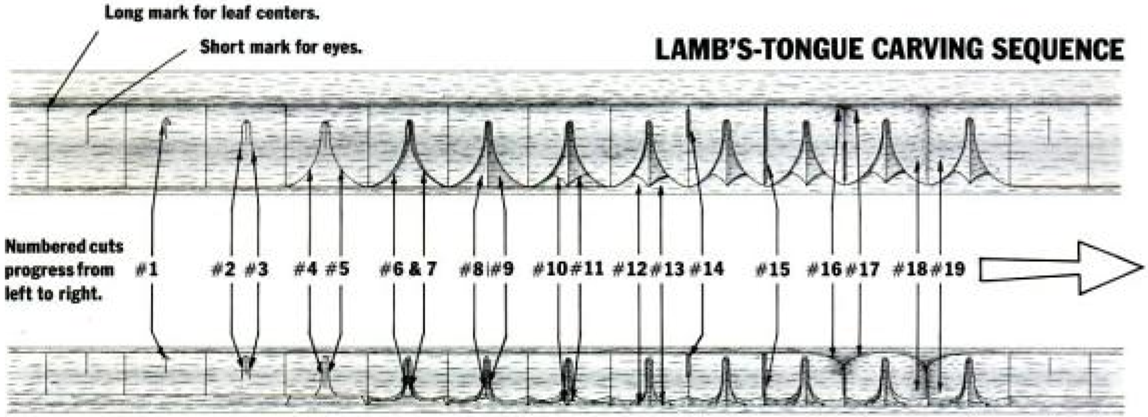
The first step is to use the parting tool to remove the waste wood from between the berries. Run the tool exactly in the middle between them, cutting to about half the depth of the bead (cut #1). Be careful to get the bottom of the cut exactly in the middle between the berries. Also, leave one or two berries at the miters uncarved—it's easier to finish off the carving near the miters when the frame is joined. It also makes it easier to visualize exactly what should happen in the corner

Define the perimeter of each berry by rotating the gouge around the base, cutting to the depth of the flat on either side of the bead.



Run along the edge of the berries with a fishtail gouge to pop out the waste from between the berries. Use a pick, or your smallest gouge, to pop out the waste on the opposite side of the berries.

LAMB'S-TONGUE CARVING SEQUENCE



(carving half a pattern, especially on a miter, is difficult), and you won't have to cope with short grain.

Now take your #6 gouge, and holding the blade exactly in line with the bead, hold the handle down low, almost parallel with the bead. On this particular molding the bead "leans" toward the sight edge of the molding (the edge that forms the picture opening), and you should align your tool at right angles with this lean, as shown in Fig. 2. Place the tip of the gouge just beyond the pencil line that marks the center of a berry. With either hand pressure or gentle taps with a mallet, make a series of cuts, gradually raising the handle of the tool until the tool finishes in an upright position, rounding the berry as you go (cut #2). This should give you half a sphere. Go along the molding, doing this to each berry in turn, and then reverse directions and round off the other half of each berry (cut #3).

Be careful when making these cuts. If you raise the gouge handle too quickly, you'll form a pyramid rather than a sphere, and if raised too slowly you'll run into the next berry. As you make the cut, aim to finish just inside the V-mark left by the bottom of the parting tool. If the bead is very deep and the berries very close together, or the wood very hard, you will need to pick out the loose waste between the berries with a fishtail gouge. Once the debris is cleared, you should then be able to finish off the bottom of the sphere using your #6 gouge (cut #4).

Now you should have a perfect sphere. You'll notice that the last finishing cuts, the ones made with the gouge upright, define the perimeter of the berry. There should be a small area, running along the sides of the berry, which the tool hasn't cut. Using the same gouge, carefully join up the cuts, rotating the tool

Form the eye of the lamb's tongue by cutting straight down with a 2mm, #11 veiner.

The two cuts that outline the shape of the leaf should meet at the tip in a point. Be careful not to cut off the tip of the leaf.

Form the dart between the leaves by cutting with the gouge at about 45° to the molding, bevel-side up.

Then turn the gouge over and cut away the waste up to the tip of the leaf.

completely around each berry and setting in to the depth of the flat on each side of the bead (cut #5). As you do this, be very careful not to shave any wood from the circumference of the berry. If you do, the berries will vary slightly in width, and they'll look bad. To keep the berries lined up, leave a narrow band of the original bead profile—no more than $^1/_{32}$ in. wide—across the center of each berry as shown in Fig. 2.

A word of warning. If you make the setting-in cuts too deep, they'll show when you finish the frame; if they're too shallow, the waste won't break away cleanly. Try to get your cuts level with the flat on the sight side of the bead and the "quirk" on the opposite side of the bead. (See Fig. 2.)

Now for the fun part. If the cuts are made cleanly and well, when you run along the sight side of the molding with a #5 fishtail, the waste should pop out cleanly, and you'll be left with a series of perfect berries (cut #6). I used a #5 fishtail gouge on this molding, because the ground needs to point up towards the quirk. Were the bead on a flat, as they normally are on most moldings, a flat chisel or a #2 gouge would be the tool to use. To pop out the waste in the quirk on the opposite side of the bead, use your pick or the smallest gouge that you have (cut #7).

Notice that when carving the berries, each cut used to form the berries (six individual cuts per berry; seven if you need to pick out the waste) should be repeated along the length of the molding before making the next cut in the sequence. There are several reasons for this, and this methodical, repetitive way of working is one of the greatest aids in achieving uniform, crisp moldings. First, it's by far the fastest way to work, because you spend the minimum amount of time picking up tools, and because as you move along the molding, your hands are in the right position for the next cut. There is a minimum of wasted mental and physical energy. Finally, this method of work is the surest guarantee of the cuts being similar because they are executed all at once.

Marking Out the Lamb's Tongue

The lamb's-tongue pattern is more challenging to carve than the berry pattern, and it's best to practice on some scrap molding before starting on your frame. As with the berries, the first step is to mark out the pattern. Begin at the miters, as you did with the berries. The miter leaf on this pattern is a full half leaf which will be completed by the half leaf on the other side of the miter (See Fig. 2.)

Dry fit two mitered sections of the frame together, draw in a full corner leaf that looks good, and transfer this pattern to the other miters of the frame. Separate the two sections, and working on the molding that you intend to carve, set your dividers for the width of one "leaf," from "eye" to "eye" (the round that marks the top of the dart between the leaves). Mark out all the eyes, and then shorten the dividers by one half and mark in the centers of the leaves, which fall exactly halfway between the eyes. Make two separate marks for the eyes and the centers—say a long mark for the centers of the leaves and a short mark for the eyes—so that you don't get the two mixed up and make cuts in the wrong place. (See drawings.)

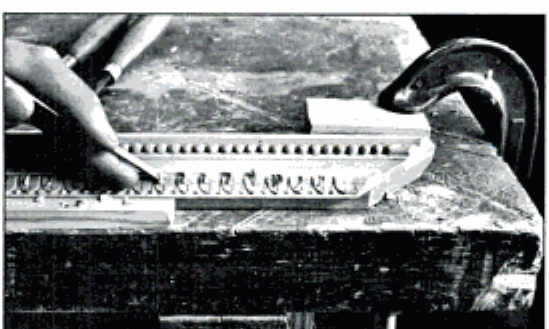
At one end of the molding, draw out the complete pattern of leaf and dart a couple of times to work out the shapes. (You don't need to draw *every* leaf, just a few). When you've drawn them out nicely, and have made sure that your tools fit the curves made by the pencil lines, it's time to carve. The entire sequence of 19 cuts is shown in the drawing on page 36. Most of the steps are also illustrated in the photos.

You'll need seven tools to carve the lamb's tongue: a 2mm, #11 veiner, a 5mm, #3 gouge, a 5mm, #5 gouge, a 3mm, #5 gouge, an 8mm, #3 fishtail gouge, a $^1/_4$-in. beveled chisel, and a 5mm, #6 gouge.

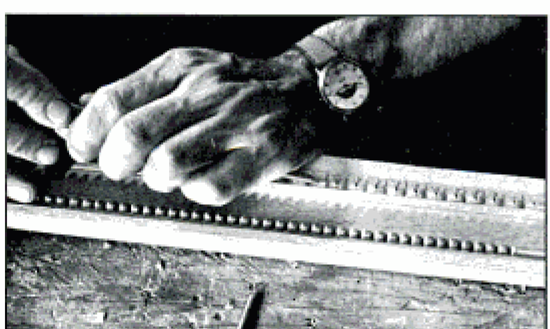
The first step is to take the #11 veiner, and cut straight down to form the eye, moving from short pencil mark-to-short pencil mark all along the molding (cut #1 on the drawing).

Now take your #3 gouge, and starting from the leaves that you've drawn on one end, make the first cut that leads down from the eye that you've cut (cut #2). Don't undercut or bevel the sides of the leaf, keep the tool at right angles to the surface. Go to the next eye, and make the same cut and so on down the line of leaves. Now go back to the beginning, realign your tool with the other side of the leaf, and repeat that cut down the line (cut #3). Your pressure on the tool at this point shouldn't be too great—aim to cut to just under $^1/_{16}$ in.

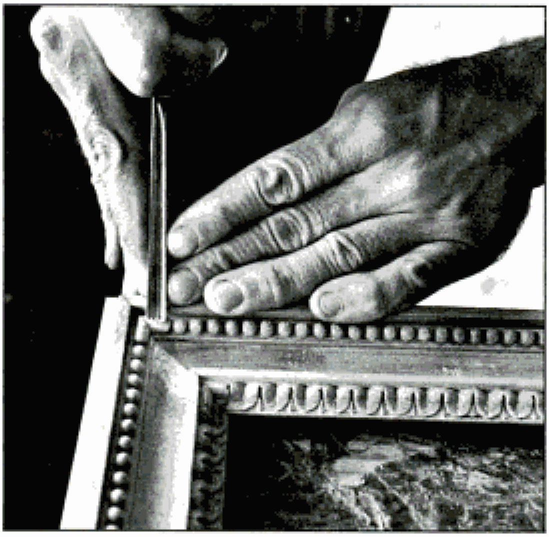
The next cut finishes the outline of the leaf (cut #4). Again, start with the leaves that you've already drawn. Place the very edge of your gouge in the cut that you've already made, and cut so that the other side of the tool follows your pencil line to the tip of the leaf. Try to get the profile smooth and sweetly flowing. Pressure at this stage should be great enough so that the cut goes down to the level of the groundwork, or flat, that runs in front of the leaves at the edge of the



Round over the tops of the leaves with a #5 gouge, bevel-side up.



Raise the handle, rounding the leaf as you go.



Leave the corners uncarved until after the frame is assembled.

molding. Again, cut one side of the leaves all the way along the molding, and then go back and cut the opposite side (cut #5). The two cuts should meet in a point. Be careful not to cut the tip of the leaf off, or you'll end up with a line of leaf tips that goes in and out. Don't leave a flat on the front of the leaves, either.

You may find that you don't have a tool that's big enough, or the right shape, to make this cut in one pass. Don't worry. The way to overcome this is to start with your tool edge in the cut that you've already made, press down with greater pressure on the side of the tool that's in the cut. With the other side just above the surface of the wood, slide the tool around until the other side is above the leaf tip, and then cut down. These sliding cuts are used frequently in carving and give a nice shearing cut.

The leaf shape should now be nicely defined, and it's time to remove the wood from between the leaves to form the dart. Starting from the eye, take your #3, 5mm gouge, and holding it at about 45° to the molding with the bevel side up, cut between the leaves until you reach the bottom of the cut (cut #6). The waste should pop cleanly out. Make this cut all the way along, then change sides, and cut away the other side of the dart (cut #7). Aim to form a sharp ridge that runs exactly down the middle of the leaves.

Now take a #6, 5mm gouge, and with the edge resting on the sloping side that you've already formed, and with the bevel-side down this time, cut away the waste up to the tip of the leaf (cuts #8 and #9). You'll notice, that for your cut to join cleanly with the outline of the leaf, you'll have to swing the handle of the tool around. You should achieve a natural rhythm as you go down the line of leaves. When you're done, you should have cleanly outlined leaves, with a sharp ridge running down between them.

Forming the dart between the leaves is quite simple. Take your #5, 3mm gouge and cut straight down between the tip of the dart's sharp ridge and the side of the leaf, until you reach the flat. Do this on both sides of the dart (cuts #10 and #11). At this point, you may find the initial cuts that defined the tips of the leaves (cuts #4 and #5) aren't deep enough and that you need to again define the outline of the leaf tips.

Next, holding your #3 gouge parallel with the flat in front of the leaves, use the very tip of the tool to slide between the leaf tip and the dart, and pop out the waste (cuts #12 and #13). You may find, because of grain direction working one way rather than the other, you get better results. Try cutting both ways, and use the direction that gives you the cleanest cut.

Now that your shapes have been outlined, it's time to model the leaves. On lamb's tongue, the modeling is quite simple, involving only rounding the sides of the leaf into the center.

Start by taking a straight chisel, something like a 1/4-in. bevel-edge, and cut straight down exactly in the center of the leaf, starting at the top (cut #14). Because the molding is humped at the top, you'll have to rock the tool to get into the quirk (the V-shaped groove behind the ogee molding) and into the hollow that leads to the leaf tip. Cut quite deeply at the top, a little over 1/8 in. When you've done all the tops, move the chisel down, and join your first cut with the leaf tip (cut #15). This cut should be fairly shallow, just 1/16-in.

Start your modeling on the top of the leaves—the area between the eyes. Take your #5, 5mm gouge, and holding it bevel-side up and parallel with the molding, use the same gradual cutting motion that you used to round the berries, and gently round over until your tool tip joins up with your chisel cut (cut #16). Repeat this cut on the opposite side of the leaf (cut #17). Don't take off any wood from behind the eye. When you've done all the tops, take a #6 gouge, and this time with the bevel down and the tool edge resting in the cut you've already made, cut in toward the center cut again. Do this cut on both sides of the leaves (cuts #18 and #19), and you should have a leaf with both sides sloping into a sharply defined center. You'll probably find that at the top, in the quirk, you need to use a flat chisel to cleanly finish off the flat that runs behind the leaves.

Try not to leave any flats at the outside edges of the leaves especially toward the tips. Make your cuts start at the very edges of the leaves to give them a fine, delicate look. Be careful, though, not to actually cut the profile, because this will make the profile of the leaves uneven and unsightly.

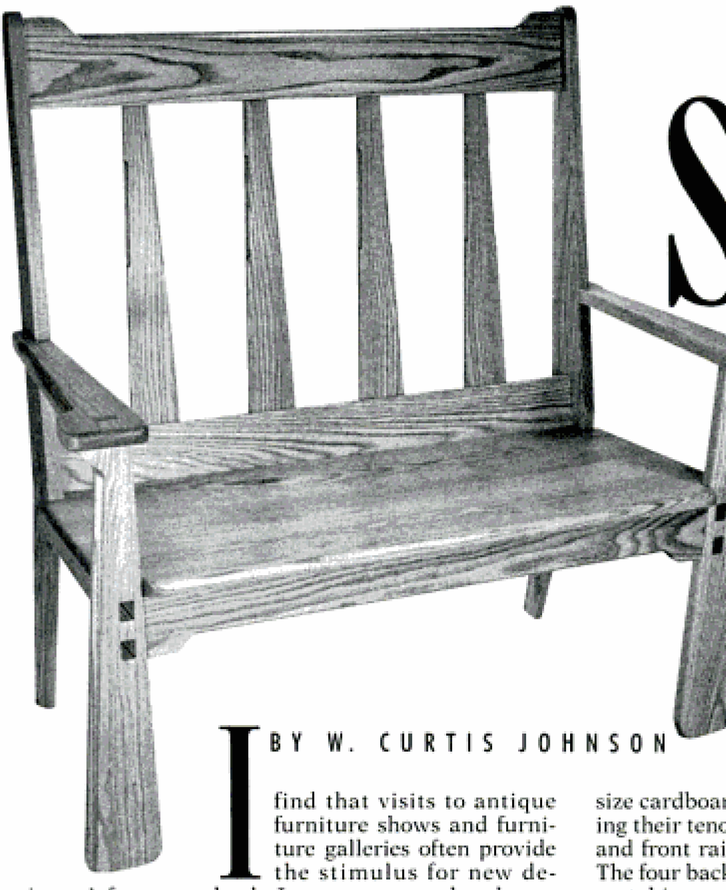
Carve the four sides of the frame, and then join them together. For a frame of this size, I used PVA glue and a couple of 1 1/4-in. nails driven at right angles across the miter. Join the four carved sides of your frame, hang the frame up to dry, and then inspect it. You may need to gently clean up the corners, making sure that the moldings run cleanly into each other at the miters. If the moldings were well-run to begin with, this should involve little or no work.

Carve in the berries and lamb's tongue on the miters, and you're ready for finishing. If, after having a go at this pattern, you've developed an appetite for carved moldings, there are many more patterns to carve and an infinite number of applications. ▲

Ben Bacon is a professional carver in London. He specializes in carved and gilt furniture, mirrors and picture frames. He wrote about carving paterae in the November/December, 1988 AW and sharpening carving tools in the May/June, 1989 AW.

Wedged Tenons Add a Decorative Touch

SETTEE FOR TWO



BY W. CURTIS JOHNSON

I find that visits to antique furniture shows and furniture galleries often provide the stimulus for new designs. A few years back, I came across a handsome settee in an antique show, and I sketched it for future reference. When the Northwest Gallery of Fine Woodworking invited me to submit a proposal for its 1988 Furniture Exhibition, I used the sketch as the inspiration for the settee pictured here. The piece was on display for the month of November, and sold to a visitor from Alaska.

I worked for unity in my design; the "horns" on the crest rail are repeated on the front legs, the arms and the frame that supports the seat. To emphasize the design, I embellished several of the curved members and also the back slats with coves. I used simple ratios in the dimensions, and the tapers are either 1 in 24 or $1^1/_2$ in 24. The seat is tilted 3° off horizontal, and the back makes an angle of 96° with the seat. I prefer 100° for comfort when designing side chairs, but the lower angle seemed appropriate for a settee. It also put the top of the back in line vertically with the bottom of the rear leg. (See Fig. 1, Side View.) Mortise-and-tenon joints are used throughout, with wedged, through tenons where possible. I like the decoration of end grain and contrasting walnut wedges.

Building the Settee

I chose to make the settee out of oak. To make the seat, I edge glued two 9-in. wide boards. I made full-size cardboard outlines of all the other pieces, including their tenons. (See Fig. 1.) The top rail and the back and front rail of the frame are plain sawn for figure. The four back slats are straight, vertical grain. I chose matching grain patterns for the pairs of front legs, back legs and side rails.

With the outlines traced on the lumber, I cut out all the pieces on my bandsaw. I did the straight cuts against a fence, but I cut the curves and tapers freehand. Leave cutting the notch where the arm meets the back for later. Clean up your cuts on the jointer or with a plane. A drum sander chucked in your drill press works well on the curved cuts. Cut a bevel on the top edge of the front rail so that it angles 3° down toward the back. Bevel the top edge of the rear seat support, so that at its top, it makes an angle of 96° with the back rail when glued. (These bevels allow for the tilt of the seat. See Fig. 1, Side View.) Round over the horns at the top of the back.

Dimension all four back slats at the same time. I begin by thicknessing the slats on my planer and finish with a hand plane and a scraper to produce a particularly smooth surface. The resulting thickness is a bit more than $^1/_4$ in., which I plane down carefully to fit the slats in their respective mortises.

Cutting the Mortises

I cut all the mortises with a plunge router equipped with a $^7/_{16}$-in. OD template guide and a $^1/_4$-in. bit. The through mortises are 1 in. × $^{23}/_{32}$ in., so taking the guide into account, the opening in the template should be

PHOTOS BY W. CURTIS JOHNSON

1³/₁₆ in. × ²⁹/₃₂ in., at least in theory. Theory never seems to work quite right for me, so be sure to test your template on a scrap of wood. The blind mortises are 1¹/₂ in. × ³/₈ in. Mark out the mortises slightly oversize, equal to the size of the openings in the templates. The front rail is inset ¹/₁₆ in. from the front leg.

I cut the through mortises with a back-up board mounted on the underside of the cut. This not only protects the workbench, but also helps prevent chip-out. I use a ¹/₄-in. dia., four-flute carbide end mill (available from MSC Industrial Supply Co., 151 Sunnyside Blvd., Plainview, NY 11803, 800-645-7270; order No. 0180816). This extra-long mill has 1-in. length of twisting cutters that shear cleanly, which is another reason I don't have trouble with chip-out. After cutting through the board, vacuum out the mortise, and cut at full depth again to ensure that chips have not kept the guide from engaging the template.

Wedged tenons and routed coves embellish this handsome two seater.

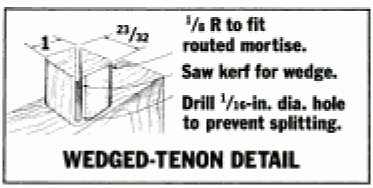
Cutting the Tenons

Mark out the tenons and their shoulders. The top of each back slat is really a tenon, so be sure to mark the correct length of these pieces. The cardboard outline for the front leg will provide the angle for the tenon shoulder profile on each end of the front rail. The tenons on the side rail should be parallel to the bottom edge of the side rail, as the top edge of the rail has the 3° slant for the seat. I scribe the shoulder lines on the faces and the edges deeply with a knife, and I chip out along the line (on the waste side) in preparation for cutting the shoulders. Blind tenons can be measured, but through tenons should be marked directly from their mortises. The through tenons themselves are cut a tad oversize on the bandsaw. I remove as much waste as possible with the bandsaw, but in the end, all the shoulders are cut to the line with a chisel in the same way that you would make shoulders for dovetail joints. You can undercut the shoulders slightly to help with the fit.

My trusty Record No. 073 rebate plane will trim the slightly oversize tenons, shaving by shaving, for a perfect fit to their respective mortises. The through mortises are ¹/₃₂ under the thickness of ³/₄-in. boards. This is because, to get a good fit on a through mortise, it's best if you plane the tenon down slowly until it just fits.

Next, with a dovetail saw, saw a thin kerf for the wedges in the through tenons. Be sure that the wedges on all your tenons angle consistently. After sawing nearly to the bottom of the tenon, round the bottom of the kerf by drilling a ¹/₁₆-in. hole. The hole will help prevent splitting when the wedge is pounded into the kerf. (See Fig. 1.) Round the corners of the through tenons with a file.

FIG. 1: THE SETTEE



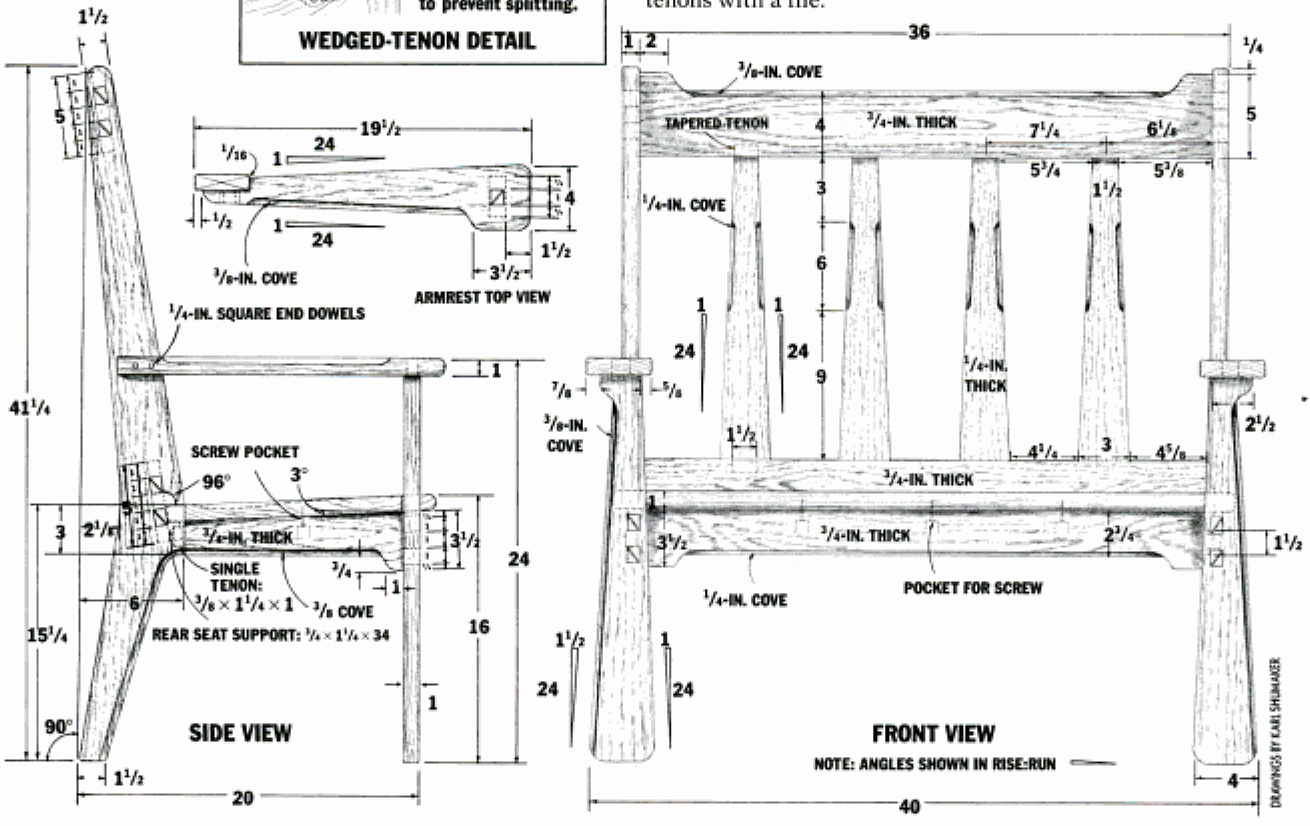
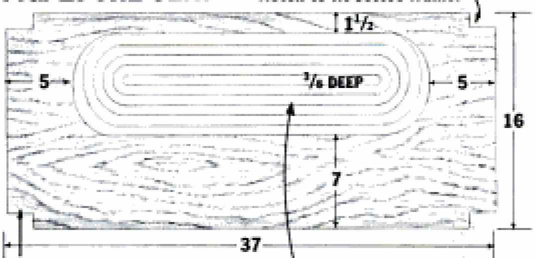
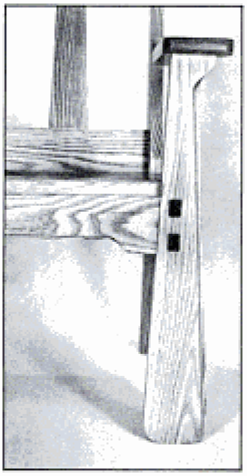


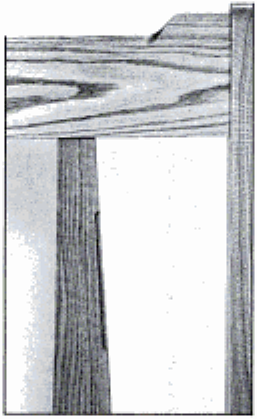
FIG. 2: THE SEAT



Leave space between this edge and front leg for wood movement.

Hollow out the seat to ⅝-in. deep to make it more comfortable.





Routed coves emphasize the graceful curves on legs and rails. Smaller coves ornament the back slats.

Assembling and Finishing the Settee

Except for the seat and the arms, you are ready to dry assemble your settee and check the fit of the joints. Arrange the slats to take advantage of the grain patterns. Take off another shaving if a tenon is too tight. The shoulders should fit tightly; if they don't, I trim them with the rebate plane.

Now is the time to make the wedges. Crosscut a number of 2-in. ends from a walnut board. Tilt your bandsaw table 2° and rip wedges, turning the board over for each cut to make wedges with a 4° inclusive angle. Cut the wedges slightly oversize, and then in a dry run, tap each wedge about ⅔ of the way into its through tenon. Then file it to size, keeping the curve of the rounded tenon. Remove them, and label the matched wedges and tenons so you won't mix them up.

To fasten the seat it's easiest to drill the pockets for the seat screws before assembly. Drill these pockets with a Forstner bit on the insides of the rails, and then drill all the holes for screwing down the seat. Holes in the rear seat support can be the normal size, but holes in the rails must be oversize to allow for wood movement. There are three screws in the front, three in the back, and one in each side.

Before you start routing the coves, you'll need to glue the side rails to the rear legs. A little glue around the top of the tenon and around the top inside of the mortise will go a long way.

I rout coves on my router table, using carbide-tipped cove bits with a ball-bearing pilot. Remember that the bit will cut about ⅝ in. on either side of the bearing center when you mark out the stopping places on your pieces. Rout the cove in several passes taking off 1/64 in. in the final pass to produce a smooth surface. Stop far short of the horns, then extend and taper off the cove with a sharp gouge.

I prefer to sand my pieces before gluing. Since the surfaces are already planed and scraped, this is not much of a task. A little sanding with 150-grit followed by 220-grit smooths the project.

Final assembly begins with gluing the rear seat support to the rear rail. (See Fig. 1, Side View.) Be careful to glue it so the angle with the rail is 96°. Next, assemble and glue the slats, rails, and rear legs of the back. It's a lot to put together, so be prepared. The wedges will expand the through tenons to make up for minor errors, but don't hammer them in too hard. Put a clamp at the sides of each mortise to avoid splitting. Glue the front rail between the front legs, and finally, glue this section to the assembled back.

I glued up and surfaced the seat at the end, because a wide, unfinished board tends to warp. Fitting the board around the legs is probably the hardest part of the project. Take your time and get all the angles correct. It is important to leave some space between the front leg and the seat for wood movement. (See Fig. 2.) I roughed out the hollow in the seat with my router, as shown in Fig. 2. You could also use an inshave or a gouge. A flexible disk sander with 80-grit paper makes short work of connecting the contours formed by the router. Finally, work down through the grits using a palm sander equipped with a large sponge-rubber pad. Use your router to round-over the arms and seat as shown in Fig. 1 and photos.

Screw on the seat before adding the arms to the settee, since the seat is too large to be fit later. Hold the arms up and mark the position where you will need to cut the notch for the back legs. (See Fig. 1, Armrest Top View.) Cut the notch, and glue the arms in place. Then drill holes for two ¼-in. dowels of walnut at each side. The dowels will add shear strength to this joint. I don't like round dowels because they look like plugs for screw holes. In contrast, square dowels have a visual appeal. I can mimic them by squaring the top of the hole and making my own dowels with a square top. (Dowel formers are available from Woodcraft, P.O. Box 1686, Parkersburg, WV 26102; order No. 14D42.)

Cut the ends of dowels and through tenons off flush. Now only the final sanding and finishing remains. The ends of the dowels and through tenons were touched up with a hand plane and some 150-grit sandpaper. I hand sanded the entire piece briefly with 220-grit, and then used two undercoats of Sam Maloof's poly/oil finish, sanding with 400 wet and dry paper while the first coat was still wet. Two coats of Maloof's oil/wax finish, the final wet coat sanded with 600-grit, completed the project. (Sam Maloof's finishes are available from The Woodworker's Store, 21801 Industrial Blvd., Rogers, MN 55374; order No. P7235 for poly/oil gloss, P7236 for poly/oil satin, and P7237 for oil/wax.) ▲

W. Curtis Johnson is a bio-physicist in the Department of Bio-Chemistry/Bio-Physics at Oregon State University. He is also a part-time professional woodworker and contributing editor for AW.

NEW ENGLAND PINE CUPBOARD

Simple Cabinet From Bygone Days Will Fit Right in With Your Country Antiques

BY FRED MATLACK

During the last century, cupboards like this one were common in kitchens across the land. These "jelly cupboards," as they are called, provided space for canned goods and other foods that would be kept for long periods of time. They didn't need the punched tin panels that provided air circulation on "pie safes," so the doors were often of frame-and-panel construction.

Jelly cupboards came in all shapes and sizes and were made of whatever wood was available. The cupboard shown here is a reproduction of a New England-style cupboard. It's made of pine, with two shelves inside. Placed in your kitchen, dining room, or anywhere around the home, it will fit right in with your country antiques. It would be easy to scale the dimensions of the cupboard larger or smaller, to fit a particular space in your home.

The construction is simple and straightforward. All the lumber is $^3/_4$-in. thick stock, and the only challenging joinery is simple mortise and tenon. The face frame is mortised and tenoned together and nailed to the sides of the cupboard. The back is a piece of $^1/_4$-in. plywood set into a rabbet in the sides, but you could make the back from shiplapped or tongue-and-groove boards for a more authentic approach. The top of the cupboard is nailed to the sides.

The door stiles and rails are embellished with a bead and groove around their inside perimeter. This provides a contrast with the simple, flat panels inside the door frames. I also machined a bead on the corner edges of the face-frame stiles, and the front edge of the shelves to give the cupboard more visual appeal.

Jelly cupboards like this were often built with hand-forged nails. I like the rustic feel of the old fasteners, so I took a few moments to "customize" the head of each six-penny finishing nail to simulate the hand-forged look. (See Nail Detail.) Simply lay the side of the nail head on a vise and flatten two opposite sides with a ball peen hammer. The mild, steel nails are surprisingly malleable. Then, grip the shank in the vise with the top of the head protruding just over the jaws. Flatten two top faces with the hammer and then the two opposite top faces. That's it—century-old nails in an instant.

Add country charm to your home with this reproduction cupboard.

Building the Cupboard

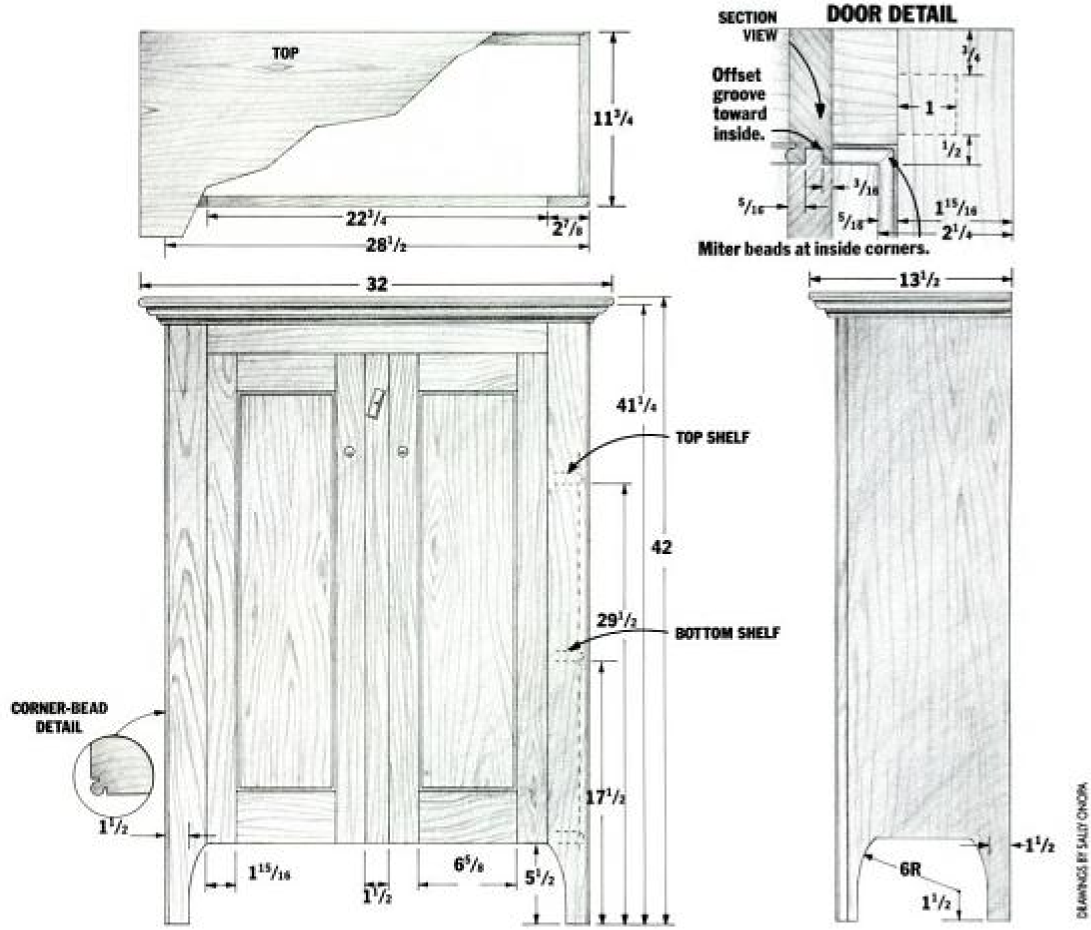
Start construction with the sides. Cut out the feet, and make dado slots for the shelves, and rabbets for the back. Cut the shelves and back to size, with a router and a $^5/_{16}$-in. edge-beading bit (available from MLCS, P.O. Box 4053 C2, Rydal, PA 19046). Cut a bead on the top and bottom front edges of the shelves. (See Shelf-Bead Detail in Exploded View.) Glue and nail the shelves, sides and back together.

The face frame of the cupboard is made of two vertical stiles and a center stile, spanned by a rail at the top. With the same $^5/_{16}$-in. edge-beading bit, cut a bead on the corner of the face-frame stiles. Run the beading bit once on the front edge and once on the side edge of the stiles at the corner. (See Corner-Bead Detail.) The result is a single $^3/_4$ round bead down the length of the stiles. Lay out and cut the mortise-and-tenon joints to fasten the face-frame stiles, center stile, and rail together. Glue and nail the face frame to the sides and shelves.

I softened the edge of the top with a gentle bullnose. To do this, I used a $^3/_4$-in. round-over bit in a router, but set it for only a $^1/_8$-in. depth-of-cut. Next, I nailed the cleat to the underside of the top, then nailed the

PHOTOS BY DENNY GILLETTE

FIG. 1: NEW ENGLAND PINE CUPBOARD



Cutting the mortises is quick and accurate with a hollow-chisel mortising attachment in a drill press.

top to the sides and nailed through the back into the cleat. I cut the molding on a shaper and nailed it around the front and sides of the cupboard. I chose a common crown-molding profile. You can purchase this type of molding ready-made in most lumber yards, or mill your own.

Making the Doors

First cut the stiles and rails to size, then lay out and cut the mortises in the stiles. Note that the bottom door rail is wider than the top door rail. Next, with the same beading cutter as before, rout a bead on the inside edges of the stiles and rails.

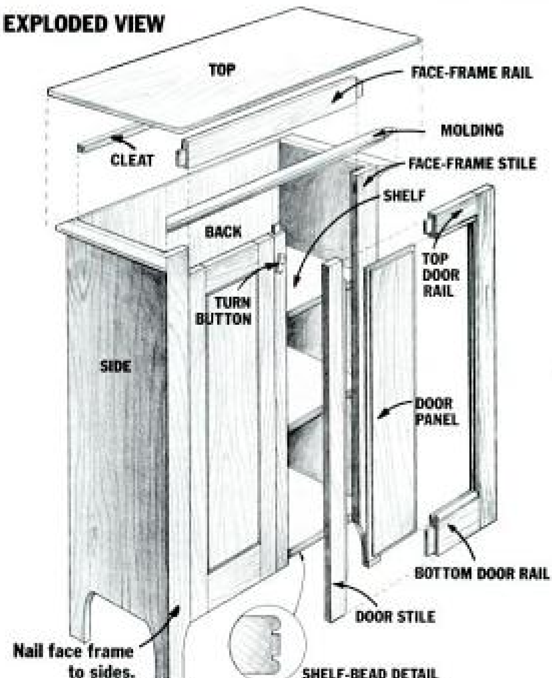
Cut a ¹/₄-in. wide groove along the inside of the stiles and rails to accept the door panel. If this groove were centered, it would come too close to the beading groove, weakening the attachment of the bead. So I offset the panel groove toward the inside of the door, as shown in the Door Detail. I cut the groove with two passes on a tablesaw, but you could also use a router or shaper.

The beads along the inside edge of the stiles and rails are mitered together where they meet. Mark the locations of the miters at the inside corners of the door

BILL OF MATERIALS

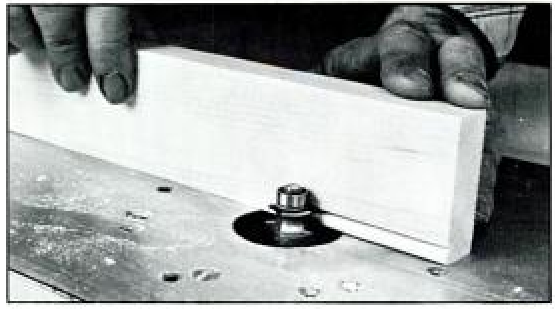
PART	QUANTITY	DIMENSIONS
Sides	2	3/4" × 11" × 41 1/4"
Shelves	3	3/4" × 10 3/4" × 27 3/4"
Back	1	1/4" × 27 3/4" × 35 3/4"
Face-frame stiles	2	3/4" × 3" × 41 1/4"
Face-frame rail	1	3/4" × 2 1/2" × 24 3/4"
Center face-frame stile	1	3/4" × 1 1/2" × 34 3/16"
Top door rails	2	3/4" × 2 13/16" × 8 5/8"
Bottom door rails	2	3/4" × 4" × 8 5/8"
Door stiles	4	3/4" × 2 1/4" × 33 1/8"
Door panels	2	3/4" × 6 5/8" × 26 7/8"
Top	1	3/4" × 13 1/2" × 32"
Molding	1	1 1/2" × 1 1/4" × 65"
Cleat	1	3/4" × 3/4" × 27"
Turn button	1	1/2" × 3/4" × 2 1/2"
Brass hinges	2	1 1/2" × 1 1/2"
Porcelain knobs	2	
Round head brass screw	1	#6 × 1 1/4"
6d finishing nails		

EXPLODED VIEW

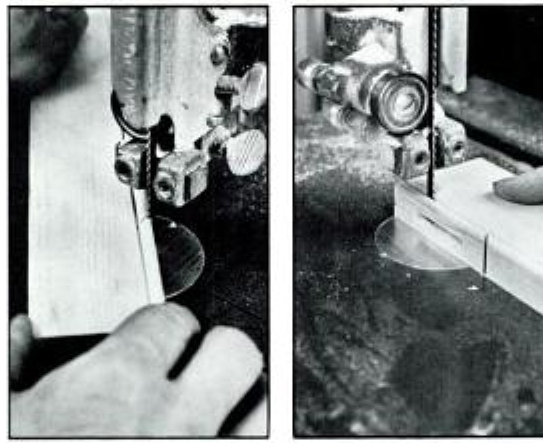


frames. Make the 45° miter cut across the beads. On each stile, remove part of the bead by cutting straight down the bead groove, from the ends of each stile to the miter. (It's not necessary to remove part of the bead on the rails, because cutting the tenons will remove that whole area on the rails.) I made both the miter cuts, and the bead-removal cuts freehand with a bandsaw. Cut the tenons on the rails with a tablesaw.

Finally, cut the door panels to size, and make a 1/4-in. wide tongue around their perimeter on the tablesaw. Be sure to offset the tongue so it matches the offset groove in the door frame. Assemble the door frames and panels, but don't get any glue in the panel groove. Mount the doors with the brass hinges, and mount the porcelain door knobs (available from Paxton Hardware, 7818 Bradshaw Rd., Upper Falls, MD 21156). Make a turn button, and install it with a round head brass wood screw.



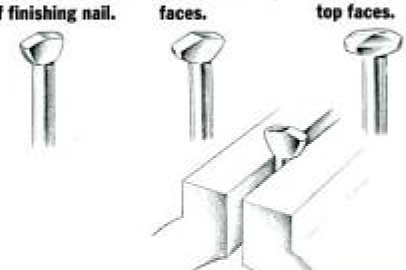
Rout a decorative bead on the face-frame stiles and door frames with a beading bit.



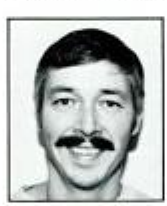
First, miter the door-frame beads at the inside corners where the stiles and rails meet. Then, remove a section of the beading by cutting down the bead groove to the miter on the door stiles and rails.

GIVING NAIL HEADS A HAND-FORGED LOOK

1. **Flatten two sides of finishing nail.**
2. **Flatten two top faces.**
3. **Flatten two opposite top faces.**



Many of the old jelly cupboards were painted. I decided to finish this cupboard with an oil stain, followed by a coat of sanding sealer, which gives a natural, non-glossy appearance. ▲

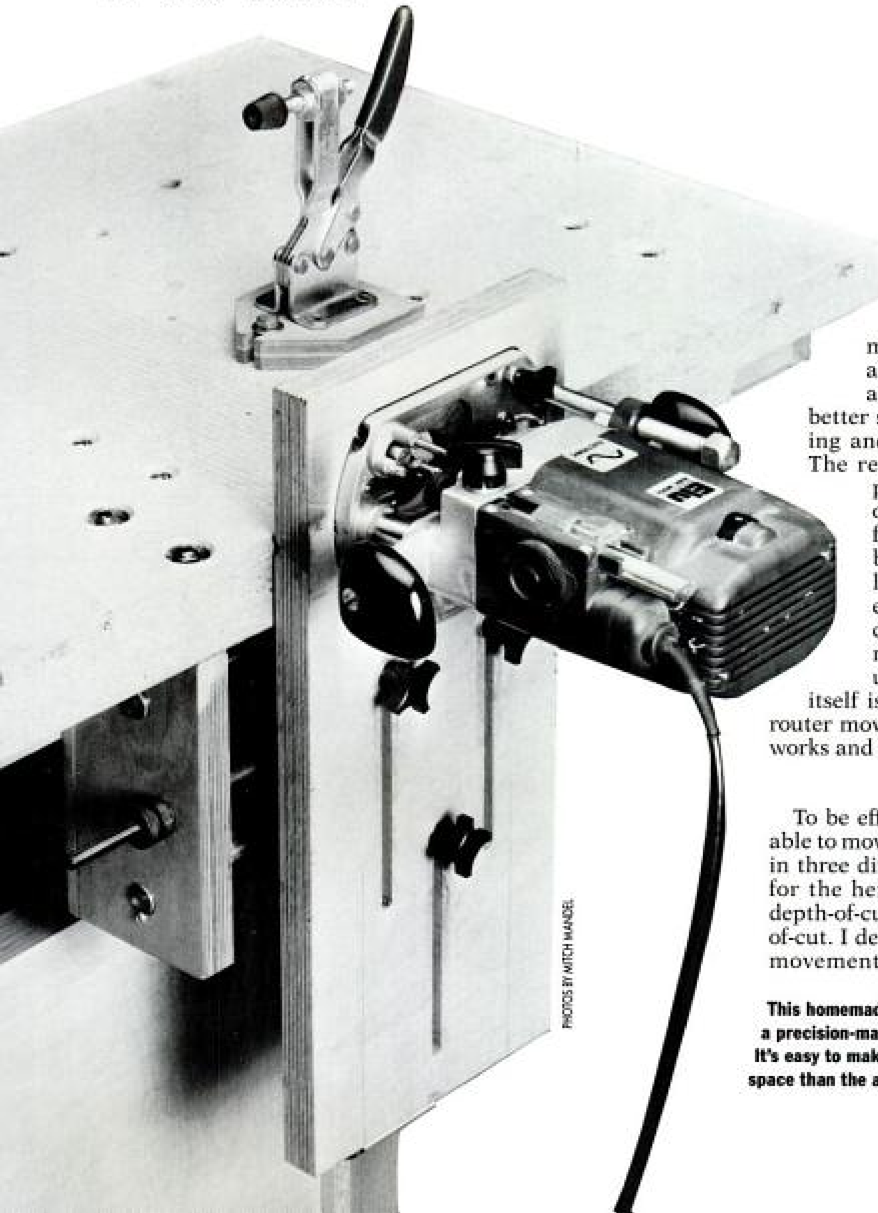


Fred Matlack heads the Rodale Press Design Group where he practices woodworking, metal working and almost every other craft you can name. Fred's ongoing passion is restoring and using antique pedal-powered woodworking machines.

SHOP-BUILT SLOT MORTISER

With This Jig, You Can Use Your Plunge Router to Cut Mortises

BY BOB MORAN



PHOTOS BY MITCH MANDEL

About a year ago, faced with the need to cut hundreds of mortises, I went shopping for a machine to do the job. I discovered that I had neither the money nor the space for a commercially made slot mortiser. After thinking it all over and listing my requirements and desires, I realized that I could better satisfy my needs by simply designing and building my own slot mortiser. The resulting mechanism consists of a plunge router mounted horizontally on a sub-base which rides back and forth on shafts that are fixed to a bench. This slot mortiser takes up little space and has proven to be extremely reliable, accurate and convenient. It even beats the commercial ones when mortising large, unwieldy stock, because the stock itself is fixed during mortising. Only the router moves. This article will explain how it works and how to build one yourself.

How It Works

To be effective, a slot mortiser needs to be able to move or be adjusted, as shown in Fig. 1, in three different directions: 1. Up and down for the height of cut, 2. In and out for the depth-of-cut, and 3. Side to side for the length-of-cut. I designed my slot mortiser with these movements in mind. As I explain how the

This homemade slot mortiser is simply a precision-made jig with a router attached. It's easy to make and use, and it requires far less space than the average slot mortiser.

mechanism moves in these three directions, refer to Figs. 1 and 2 for clarification.

Up and Down—The mechanism can be adjusted up and down by means of *check nuts* on a vertical *threaded rod* located at the bottom of the *bearing plate*. These check nuts support a *slotted aluminum plate* screwed to the bottom of the *router sub-base*, and when turned, these check nuts adjust the height of the router. These check nuts operate in conjunction with three *vertical-adjustment locking screws* which both guide and secure the router sub-base to the bearing plate.

In and Out—The in-and-out movement is performed by the plunging action of the plunge router itself. Depth is controlled by the router's own depth stops.

Side to Side—The router sub-base/bearing plate moves from side to side by means of two *linear-motion bearings* (mounted on the backside of the bearing plate) that slide along two precision-ground *steel shafts*. These shafts are mounted within a *chassis* that is fixed to a work surface. A *threaded rod* that runs horizontally through the bearing plate and the chassis controls the limits of lateral travel by means of two *check nuts* on each end. Both the lateral-travel rod check nuts and the vertical-adjustment check nuts provide a convenient $\frac{1}{64}$-in. adjustment per quarter turn of the nuts.

The chassis is installed under a workbench, table-saw extension, router table or any flat work surface that allows you to clamp the stock in the necessary position. The lead photo and the photo on page 47 show the jig with and without the router and sub-base in place. Installing and removing the router takes only seconds and doesn't interfere with the adjustments you've set on the slot mortiser.

Just a word about the hardware. The linear-motion, recirculating ball bearings in pillow blocks that ride on the precision-ground, hardened-steel shafts will set you back about $150, but they're worth every penny. They run effortlessly and come equipped with efficient dust seals.

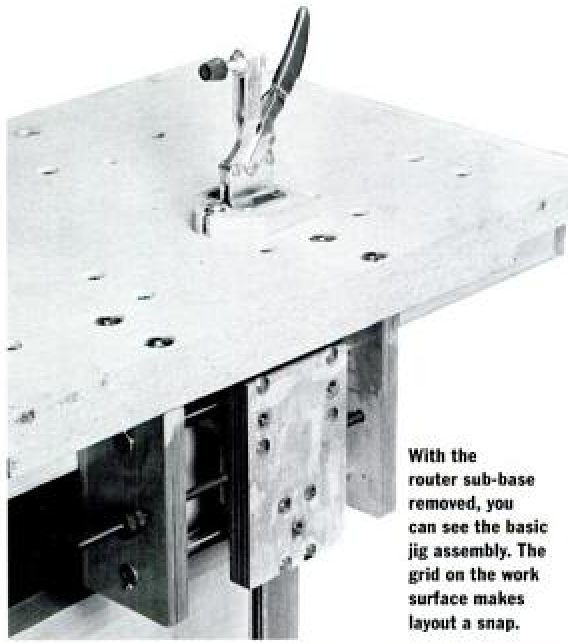
Assembling the Jig

The key to success in combining precision components such as the linear-motion bearings with a wooden chassis is to use a highly stable wood product. The best is 1-in. hard maple die-board, a high-quality no-voids plywood. (See Sources.) Alternately, you could make your own plywood, as I did, by laminating thinner "Baltic" birch. Laminate with epoxy to avoid introducing moisture.

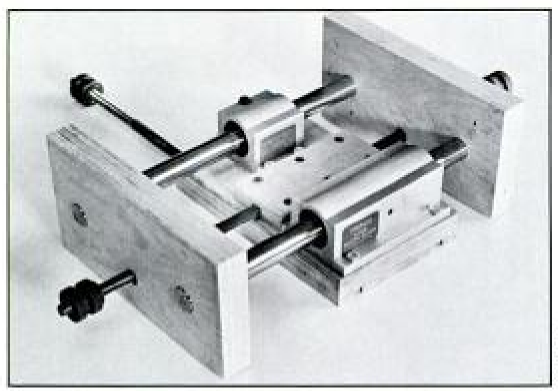
The Chassis Ends—The most critical parts that you'll be making are the chassis ends. They ensure that the shafts are absolutely parallel and that the plane of the bearing plate is perpendicular to the bench top.

To achieve the needed accuracy, cut them a bit oversize, mark the inner faces, screw them together, inner-face to inner-face, and work on them as one unit. Trim them to length and width, then lay out the holes shown in Fig. 2. Check that your drill-press table is perpendicular to the drill, and use a fence when boring the shaft holes to keep them the same distance from the edge. The shafts should fit snuggly in their holes.

The Bearing Plate—The router sub-base is mounted on the bearing plate with three locking screws screwed into three threaded inserts mounted in the bearing plate. Drill and install these inserts. If you expect to be dismounting the router frequently, you should con-



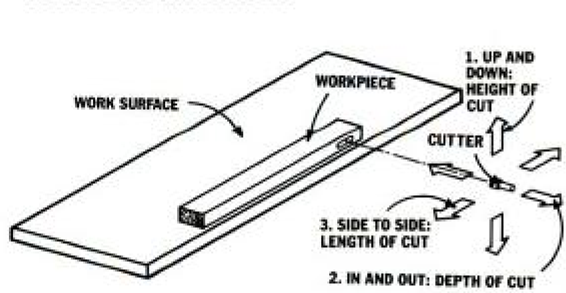
With the router sub-base removed, you can see the basic jig assembly. The grid on the work surface makes layout a snap.



BOB MORAN

Lateral movement of the router is controlled by pillow-block linear-motion bearings mounted on the bearing plate. This plate rides smoothly back and forth on the steel shafts mounted in the chassis ends.

FIG. 1: THREE AXES OF MOVEMENT OF A SLOT MORTISER



DRAWINGS BY FRANK ROHRBACH

sider Quick-Acting Inserts (available from Reid Tool Supply catalog No. QA-3, see Sources for address). They allow a locking screw to slide in and out by tilting it up. Straighten the screw, and it engages the threads.

To mount the pillow blocks accurately, refer to Fig. 3 illustration. Assemble the pillow blocks on the shafts (being careful of the dust seals), and install the shafts in the chassis ends. Next, clamp the bearing plate to the pillow blocks. Use the pillow-block flange holes as a guide when drilling the 3/16-in. holes for the #8 × 1 1/2-in. stove bolts. Countersink the bolts into the plywood bearing plate, and fasten them with nuts and lock washers. When assembled, the bearing plate should ride back and forth between the chassis ends easily and smoothly. Be sure to install the lateral travel-limiting rod and plywood cover before screwing on the chassis back.

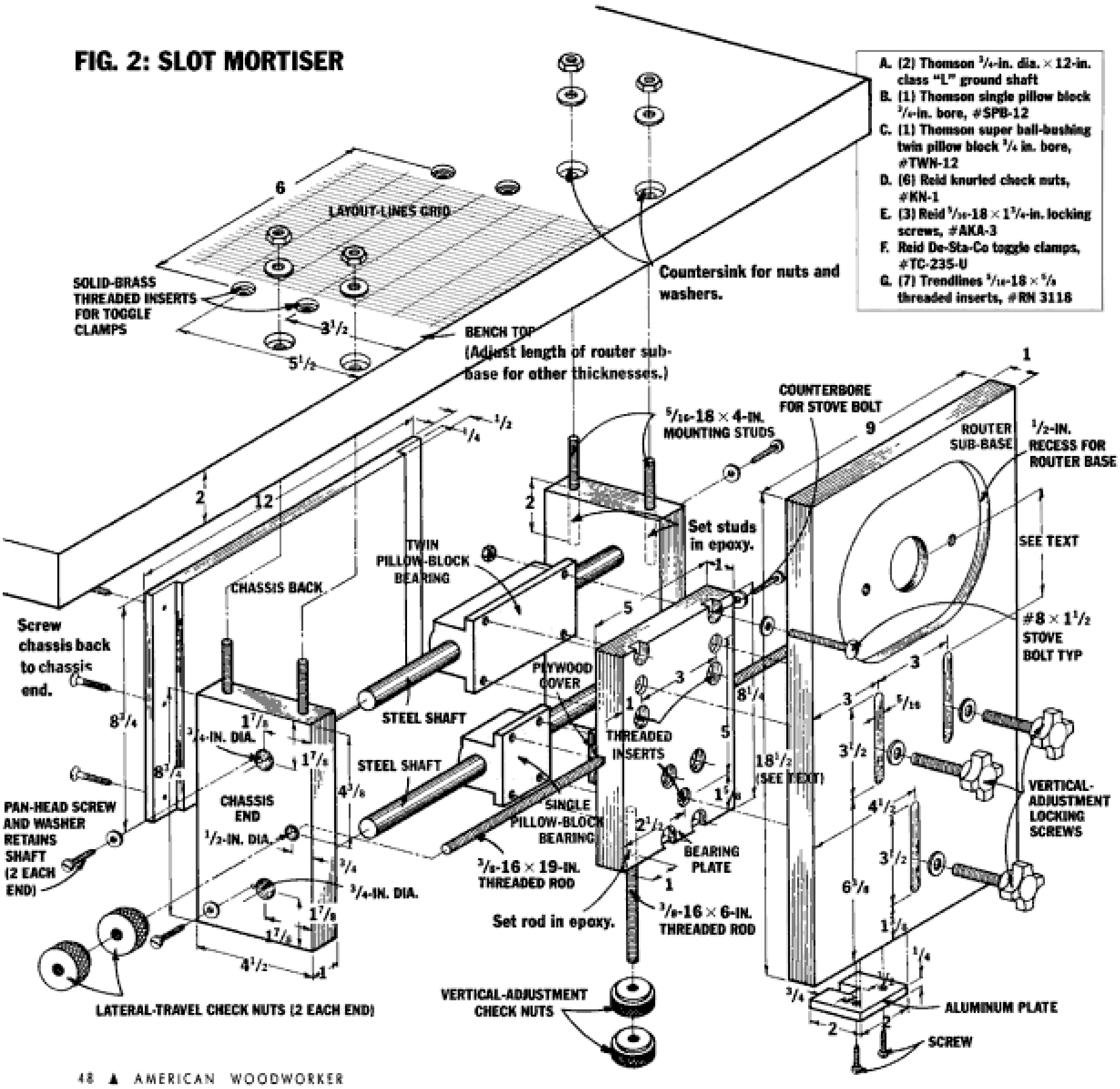
Mounting the Jig

The mounting studs must line up perfectly with the holes in the bench top to avoid distorting the chassis. One way to achieve this is to use a drilling template. Tack a scrap of plywood to the top of the chassis in the position of the bench top, and drill through this scrap into the chassis for the studs. Then, remove the scrap from the chassis, and clamp it (same-side up) under the bench top to guide the bit when drilling though the bench top.

If your epoxy is the thin, runny kind, paint the inside of the drill holes thoroughly, and leave at least a 1/2 in. of epoxy in the bottom of each hole. Paint the studs with epoxy, and insert them gently into the holes; don't push them down fast, forcing air into the hole and squirting out epoxy.

If your epoxy is the thick, pasty kind, drill a small vent hole into the bottom of the stud hole, and smear

FIG. 2: SLOT MORTISER



both the inside of the stud holes and the studs with the paste, and then push them in. Wipe up the excess and set the assembly aside to cure. Whether you use the thin epoxy or the thick epoxy, be sure it is fully cured before mounting the jig and tightening the nuts.

The Router Sub-Base

You will notice that Fig. 2 gives a suggested length for the router sub-base of $18^1/_2$ in. and no dimension at all for the center of the recess for the router base. This is because the best location of the router on the sub-base depends on the thickness of the bench top. If the bench top that you intend to use is more than 2 in. thick, increase the length of the sub-base by the difference. For example, for a 3-in. thick bench top make the sub-base $19^1/_2$ in. instead of $18^1/_2$ in.

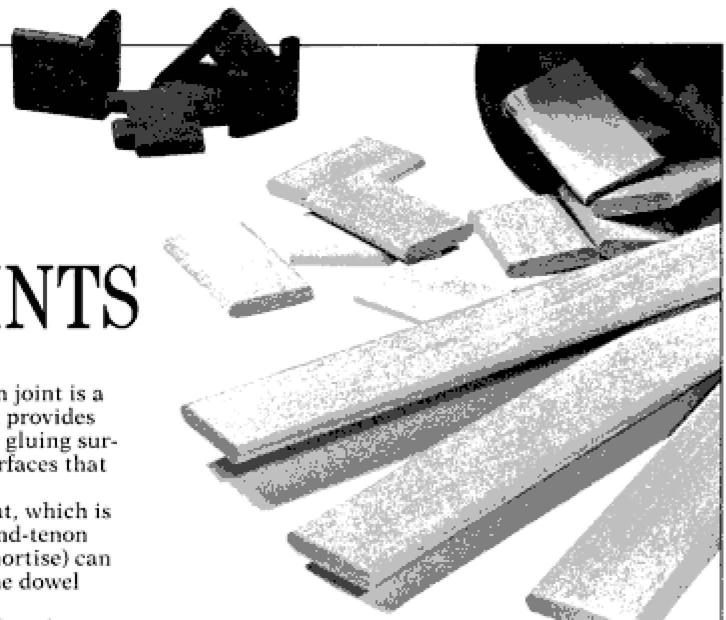
To lay out the center of the recess for the router, proceed as follows: cut the slots, and then assemble the sub-base to the bearings plate in its lowest position. Mark the router-bit center on the sub-base at about $^1/_4$ in. above the bench. Transfer the mark to the router side of the sub-base, and cut the recess for the router with a router and circle-cutting jig.

The slotted aluminum plate that straddles the height-adjustment rod is easily cut out with a carbide blade on the tablesaw. Once you've cut the slot, position the plate on the sub-base so that it straddles the threaded rod, and fasten it to the sub-base.

Adjustment

Once you complete the jig, you need to check it for alignment. There are two ways it can be misaligned: 1. The axis of the router shaft can be out of parallel with the bench top, 2. The bearing shafts can be out of parallel with the bench top. Any misalignment must be corrected by fitting shims between the chassis and

SEPARATE TENON JOINTS



HANK GOBETZ

The mortise-and-tenon joint is a good joint because it provides relatively large, areas of flat-grain gluing surface. It is these large, flat-grain surfaces that make it superior to a dowel joint.

The great feature of a dowel joint, which is really just a specialized mortise-and-tenon joint, is that the round hole (the mortise) can be quickly and easily bored and the dowel (the tenon) can be mass-produced.

With an efficient slot-mortiser the advantages of the mortise-and-tenon joint can be combined with the advantages of the dowel joint. The combination is a joinery uniquely suited to the small shop producing one-of-a-kind or limited-production furniture or high-end cabinetry.

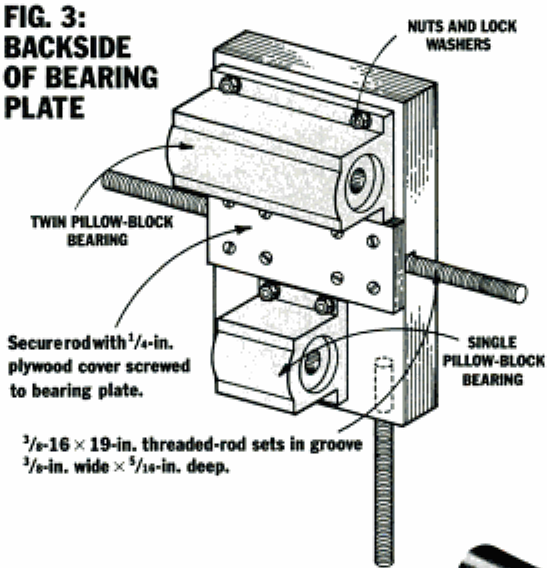
Traditionally, mortises were the hard part and tenons were the easy part. Today, it is more efficient (and just as strong) to cut two mortises and use a separate tenon. The mortises are quickly and accurately cut with the slot mortiser, and the tenons are easily mass-produced out of scrap or inexpensive wood in whatever sizes the woodworker needs. I usually use elm for tenons. In my area it is readily available at reasonable cost, machines nicely, glues very well, and it's tough.

I'll make up a special size if the need arises, but I usually use tenon stock $^1/_4$-in. thick by $1^1/_4$-in. wide, or $^3/_8$-in. thick by $2^1/_4$-in. wide, or $^1/_2$-in. thick by $3^1/_4$-in. wide. When I run low on one of these sizes, I'll make up a batch.

Making up a batch of tenon stock is straightforward: 1. Rip a length of rough stock to the rough width of the tenon, 2. Resaw to just over the desired thickness, 3. Surface to the desired thickness, 4. Joint one edge, 5. Rip to accurate width, 6. Round over the edges on the shaper (or router).

One advantage of separate tenon joints is that parts no longer need to be sized to include an integral tenon. That not only saves expensive cabinet wood, but also makes the sizing of pieces more straightforward and the woodworker less prone to dumb mistakes. And, once in awhile, the savings in wood makes the difference between almost enough and barely enough. Those are the occasions when I glance over at my slot mortiser and smile.—*B.M.*

FIG. 3: BACKSIDE OF BEARING PLATE



the underside of the bench top.

The alignments can be checked by chucking a steel dowel pin or even a router bit into the router (with the router unplugged) and measuring the height of the dowel pin above the bench top with a depth-measuring vernier or dial caliper. The height, when the router is all the way to the left, must be exactly the same as it is when all the way to the right; the height must be the same whether fully plunged in or fully withdrawn. If it isn't, mark the corners of the chassis where the measurement is high, loosen the nuts holding the chassis, and insert paper shims to shim the chassis down at the marked corners. Then, tighten it up, and check the measurements again. Repeat as necessary until all four corners measure the same.

Outfitting the Bench Top

Using the jig requires accurately positioning the workpiece on the bench and clamping it there. Reference lines permanently scribed in the bench top are useful, as shown in Fig. 2. I adjust the lateral travel according to these lines and position the workpiece to them. I suggest that at first you simply use pencil lines. Once you know what kind of a grid works best

HANK GOBETZ

BITS FOR CUTTING MORTISES

Conventional, straight router bits are not particularly well suited for cutting mortises. Specialized mortise bits specifically for wood are available in a variety of designs, but I have never tried them because I get such excellent results from machinist's end mills designed for cutting aluminum.

Two-flute, single end mills for aluminum in regular, long and extra-long flute length with or without TiN (Titanium Nitride) coating are the design of choice. Two-flute mills provide better chip clearance and ejection than multi-flute patterns. The pitch of mills designed for aluminum is good for wood. Long and extra-long flute lengths are more commonly available in mills for aluminum than in mills for ferrous metals.

TiN coating provides longer life in abrasive materials and helps protect the high-speed steel from heat if the bit is used aggressively.

Shank diameters of 1/4 in. are not common in the metal-working industry. You will want 3/8-in. and 1/2-in. collets for your router to handle mills with 1/4-in. through 1/2-in. cutting dia. More than 1/2-in. cutting dia. in end mills requires a collet over 1/2-in. in dia.—not something one sees in woodworking routers. Prices from MSC range from $6.11 for an imported 1/4-in. dia. regular length mill without TiN coating to $23.00 for a domestic 1/2-in. dia. extra-long (3-in. cut length) mill with TiN coating. Carbide enthusiasts are encouraged to look twice at these prices.

One word of caution: Sharpening any suitable bit reduces its cutting diameter, so if you intend to have bits sharpened rather than simply replace them, you may want to gauge your supply of tenon stock so that you don't wind up with lots of tenons too thick for the slots cut by the newly sharpened bits.—*B.M.*

The accuracy of this jig is dependent upon the precision of the chassis ends. To make them, attach them together temporarily, and then shape and drill for the shafts and travel-limit rod.

Instead of moving the stock, with this slot mortiser you move the cutter and the stock is held stationary. Note the toggle clamps mounted to the work surface, which hold the stock tight.

for your purposes, scratch the lines in with a sharp awl, and fill the scratches with a dark wood filler.

It's important that you be able to position a clamp on the workpiece as close as possible to the mortise. I find the most convenient way to clamp is with toggle clamps. (See photo.) I fit them where I want them using a grid of threaded inserts in the bench top. The same grid of inserts is used for holding stops and fences for production runs and even a special 45° sloping table that I've made. Use an all-brass insert if the bench is one where you commonly use chisels or planes.

SOURCES

THOMSON INDUSTRIES INC., Shore Rd. and Channel Dr., Port Washington, NY 11050, (800-645-9357): bearings and shafting.

REID TOOL SUPPLY CO., 2265 Black Creek Rd., Muskegon, MI 49444, (800-253-0421): knurled check nuts, locking screws, and toggle clamps.

BOULTER PLYWOOD CORP., 24 Broadway, Somerville, MA 02145, (617-666-1340): maple die-board.

MSC INDUSTRIAL SUPPLY CO., 151 Sunnyside Blvd., Plainview, NY 11803, (800-645-7270): end mills.

TRENDLINES, 375 Beacham, Chelsea, MA 02150, (800-343-3248): threaded inserts.

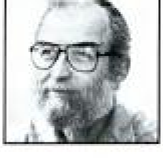
Router Modifications

Since the router operates in a horizontal position, the return springs can be a nuisance. I removed them. The spring-loaded plunge lock on some routers can also be a nuisance. I removed this too. Check the parts diagram for your router to figure out how to go about either of these modifications. Removing these parts doesn't mean that you can no longer use your router separate from this jig. These parts usually are simple to remove and simple to reassemble.

Operating Techniques

Finally, a word or two about technique. I control the rate and depth-of-plunge by keeping both thumbs against the router sub-base. I also discovered that I have smoother control applying plunging pressure with my body rather than with my hands. With end mills, I find it easier to plunge as I cut laterally rather than plunging first and then cutting laterally. Just be sure that you don't force a bit; a sharp bit works best without a slavemaster cracking a bullwhip.

That's it. Go for it. And let me know if you come up with any improvements. ▲



Bob Moran is a professional woodworker. He owns and operates the Ruah Adonai Woodshop in Middletown Springs, Vermont. He is an exhibiting member of Vermont State Crafts Center in both Middlebury and Windsor, Vermont.

Turning a Croquet

BY ERNIE CONOVER

Turning a croquet set is a great spindle-turning project, because it can be as simple or as advanced as the maker wishes. Making the mallets and stakes requires simple, straightforward spindle turning, while some tricky (but not difficult) techniques can be employed if you want to turn the balls.

If you're only familiar with the backyard, nine-wicket game played with a stake at each end of the court, you may be surprised to know that there are other forms of croquet as well. In fact, croquet has ardent devotees who compete in national and international tournaments. It's a highly competitive game that requires strategy, skill and cunning. There isn't room to go into the rules here, since there are several varieties of the game, but a rule book is available from the United States Croquet Association. (See Sources.)

Most croquet sets sold in stores today are rather puny and toy-like. As you can see by the chart that lists equipment specifications, most of these inexpensive sets are Class D or Class E sets for backyard play. There is a big difference between these lightweight mallets and a finely crafted Class A or Class B mallet designed for serious croquet. As you can see from the chart, the Class A and B mallets are longer and heavier for driving a ball that weighs up to 1 lb.

Turning the Mallet

The mallet head is just a simple turned cylinder. (Square heads are also an option if you only want to turn the handles. In fact, the majority of Class A mallets are made with square heads measuring from $2\frac{1}{4}$-to $2\frac{3}{4}$-in. square.) Adding brass hoops around the ends adds to the appearance and reduces the likelihood of splitting, but it isn't absolutely necessary.

I made my mallets from cherry, but hard maple would be even more durable. Tournament mallet heads are often made of lignum vitae to meet the weight requirements. The dimensions and weights for the different classes of mallet are given in the chart. The dimensions I used for my Class C mallet are shown on the photo. If you don't have stock large enough to turn the 3-in. dia. head from one piece, glue up thinner stock to get the thickness you need.

Mount the head blank between centers, and turn a cylinder with gouge and skew. If you plan to add brass hoops, turn a step at either end for the brass. The ends of the mallet must be flat and at right angles to the handle. Getting the ends perfectly flat with a skew and a scraper is a bit tricky. You may want to clean up the faces on a disk sander after you've gotten them as flat as you can with the skew and scraper.

If you're installing hoops, you'll need a piece of brass tubing with a 3-in. outside diameter. If you can't find brass tubing to fit (try a plumbing-supply house), you can solder rings from sheet brass, which is what I did, as shown in the photo. Before working with sheet brass, I suggest annealling it by heating the brass red hot and plunging it into cold water. This softens the brass and makes it easier to work.

Install the hoops over the mallet ends, and pin or screw them in place. For extra insurance, add a bit of epoxy to guarantee that the hoops stay put. Set the hoops back about $\frac{1}{8}$ to $\frac{3}{16}$ in. from the mallet face—they shouldn't be flush with the face. Trim the hoops with a file, if necessary, and sand them while the head's on the lathe.

CONTINUED

Support the handle with a steady rest at the center. Turn to either side, then reposition the steady rest to finish the center of the handle.

PHOTOS BY DAVID SLOAN

Drill a 1-in. hole through the mallet head for the handle tenon. Here, the author uses a "crotch center," a V-block device that fits into the tail stock for boring round shapes on the lathe.

SET

For Those Lazy Summer Evenings on the Lawn

JOHN HAMEL

Whether casual or cutthroat, croquet is a game that's fun to play. Turn a set of mallets and balls, and you'll be ready to challenge the neighbors this summer.

CROQUET EQUIPMENT SPECIFICATIONS*

CLASS A
(Suitable for tournament play)
Mallets: Round/square brassbound heads w/sight line; 36-in. shaft; 3-in. × 9-in. head; 2¼ lbs. to 4 lbs.
Balls: 3⅝-in. dia.; 1 lb. (Eclipse brand is USCA approved ball).
Wickets: Cast iron; ⅝-in. dia. uprights; 3¾-in. to 4-in. span; 6 lbs. each.

CLASS B
Mallets: Round/square brassbound heads w/sight line; 33-in. to 36-in. shaft; 2 lbs., 4 oz. to 3 lbs., 2 oz.
Balls: 3⅝-in. dia.; 14 oz. to 16 oz.
Wickets: Bent steel; 7/16-in. dia. uprights; 4-in. span.

CLASS C
Mallets: Round bound or unbound heads, plain or cord grips; 33-in. to 36-in. shaft; 2 lbs. to 3 lbs.
Balls: 3⅝-in. dia.; 12 oz. to 14 oz.
Wickets: Bent steel; 5/16-in. to 7/16-in. dia. uprights; 4-in. span.

CLASS D
Mallets: Round head; plain wood grips; 30-in. to 36-in. shaft; 1½ lbs. to 2 lbs.
Balls: 3⅛-in. to 3⅝-in. dia.; 9 oz. to 14 oz.
Wickets: Bent steel or wire; up to 5/16-in. dia. uprights; 4-in. to 5-in. span.

CLASS E
(For children and informal play)
Mallets: Round head; plain wood grips; 28-in. to 33-in. shafts; under 2 lbs.
Balls: 3-in. to 3⅛-in. dia.; 9 oz. minimum.
Wickets: Bent wire; 4-in. to 6-in. span.

*Specifications are based on United States Croquet Association standards but do not represent complete USCA specifications. For more information contact USCA. (See Sources.)

TURNING CROQUET BALLS

Turning a ball seems a bit awesome, but it's really quite easy after you get the hang of it. You need to be able to turn well enough that a "catch" is the exception rather than the rule. The method I use was taught to me by Dick Bailey, a fourth-generation turner. The procedure is clearly outlined in the book, *The Practice of Hand or Simple Turning: Volume IV*, by Jacob Holtzapffel (1976, Dover Publications, Inc., 180 Varick St., New York, NY 10014). Holtzapffel called the technique a "mechanical manipulation." There is no skill involved in making the ball round. The roundness is achieved through manipulation. Billiard balls were turned from ivory using this technique.

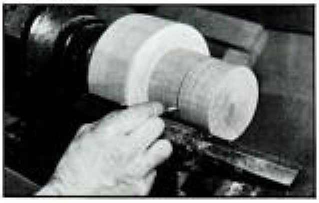
Class A, B and C croquet balls are 3⁵/₈-in. dia. and weigh from 12 oz. up to 1 lb., depending on the class. (See chart.) You probably won't find a wood heavy enough to make a 1 lb. ball, but lignum vitae should come pretty close. For a lighter ball, any of the fruitwoods would do. I finally settled on pear wood because I had a good stash from a tree that was cut down near my home.

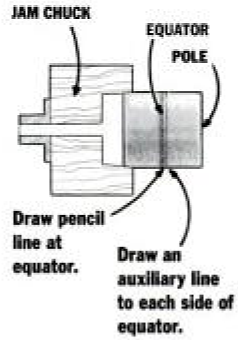
Whatever wood you use, you'll probably need to glue up stock to make the 3⁵/₈-in. dia. A water-resistant glue such as epoxy or resorcinol is a good idea, because the kids will invariably leave a ball outside now and then.

To turn the balls, make a wooden cup chuck (also called a jam chuck) to hold the ball while you turn it. The jam chuck is best made of maple or birch, though yellow poplar will do in a pinch. It's fine to glue up several pieces to get a large enough billet to make the chuck. I mount the billet on a 3-in. dia. faceplate with 1-in., #12 sheet-metal screws. After mounting, drill a hole through the chuck so you can knock out the ball with a knock-out bar.

A word of caution: Keep the speed down, and wear a face shield. Things have a way of flying out of jam chucks, and you don't want to get hit.

STAGE I:



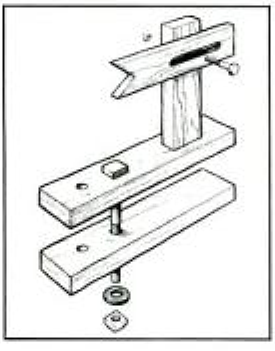


1. Between centers, turn a billet 3⁵/₈-in. dia. You can make it long enough to make several balls if you wish.
2. Cut off a 3³/₄-in. length, and pound it into the chuck. Adjust it so it spins true.
3. Face the end square with a scraper, and draw a pencil dot at the exact center of the spinning work: the "pole dot."
4. Measure back the radius of the ball (1¹³/₁₆-in.) with a pair of dividers, and draw a pencil line: the "equator." Note: drawing an auxiliary line to each side of the equator is helpful for your first few balls.

DRAWING BY HEATHER LAMBERT

Turning the Handle

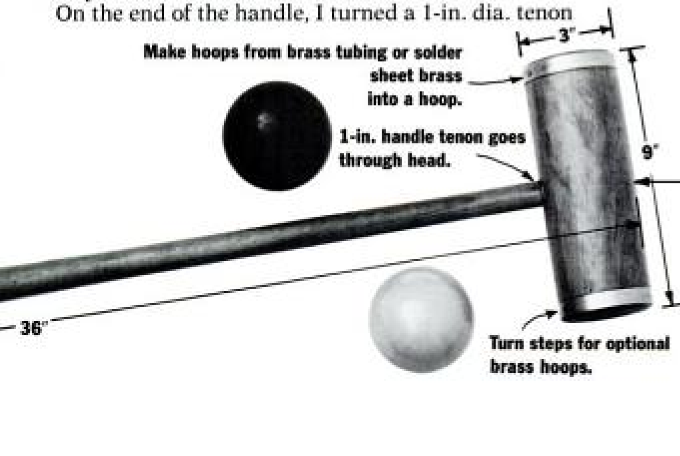
For turning the handle, you'll need a steady rest to keep the long handle from whipping as you turn it. You can make a fine steady rest from hardwood along the lines of the set-up shown in the sketch.



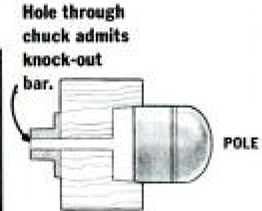
Turn the handle from a strong wood like maple, hickory or ash. Be sure the grain is straight—any run-out could cause the handle to break in play. My handle is relatively simple. The upper grip section of many fancy mallet handles are octagonal in section or wrapped with twine or leather.

Start with a 2-in. square handle blank a couple of inches longer than your finished handle. Mount your handle blank between centers, and round off a section at the center so you can bring the steady rest up against the work to support it. Lubricate this bearing point by touching a candle stub or a piece of paraffin to the spinning handle. Place the steady rest in the center, and turn to either side of it, starting in the center and working left and right toward the ends. This keeps maximum rigidity in the work for as long as possible. Of course, you'll need to reposition the steady rest to finish the center of the handle.

On the end of the handle, I turned a 1-in. dia. tenon

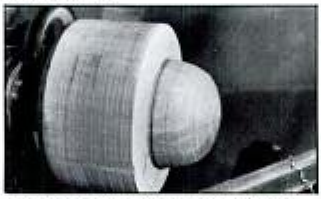


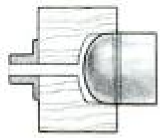
STAGE II:

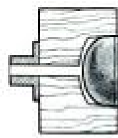


1. With a gouge, round off the sphere from the auxiliary pencil line to just shy of the pole dot. This should be an ellipse *outside* the final curve of the sphere.

STAGE III:

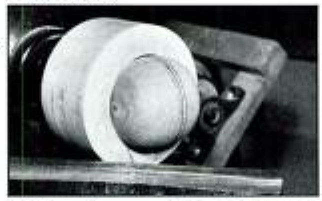


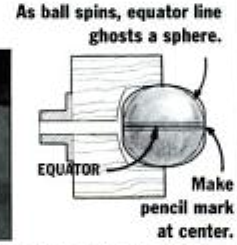




1. Knock the work out of the chuck, turn the piece end for end, and drive it into the chuck so the equator line is flush with the face of the chuck. You may have to scrape out the chuck to accommodate the work.
2. Face off the end one radius length ($1^{13}/_{16}$ in.) from the equator line with a scraper, and make a pencil mark at the center of the spinning work.
3. Round off the sphere with a gouge, as you did in Stage II. (Above.)
4. Remove the work from the chuck. (A handful of shavings in the hole ahead of the knock-out bar keeps the bar from marring the work.)
5. You now have a rough ball. If you were successful, it is a rough oval shape.

STAGE IV:





1. Turn the rough ball sideways in the chuck, aligning the pole dots with the face of the chuck. Start the lathe, and make a pencil mark at the exact center. The mark should fall dead on the equator line. If not, adjust the work with a mallet until it does.
2. Shine a bright light on the work, and start the lathe. The old equator pencil line (which is a perfect circle because it is a section of the original cylinder) ghosts a perfect sphere.
3. With a square-nosed scraper, scrape the exposed half of the ball to the ghosted line. Scrape with a very light touch. Stop frequently to inspect your progress. Don't turn away the equator pencil line.
4. Reverse the ball in the chuck and repeat Steps 1 through 3 on the opposite side of the ball. You may have to trim the chuck to get a good grip.

STAGE V:

1. Turn your nearly completed ball to any random angle, and lightly scrape again. Rotate the ball several more times and scrape again each time. The ball will now be a perfect sphere.
2. Sand the ball, starting with 60- or 80-grit paper. Rotate the ball several times, and be careful not to sand it out of round.

ue wedge in
oss-grain
w kerf to
cure mallet
ad.

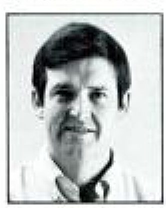
long enough to go clear through the head. I pinned it tight in the head by gluing a wedge in the tenon. Turn the tenon slightly longer than the diameter of the mallet head.

When you've finished the handle, drill a 1-in. dia. hole in the mallet head. A V-block cradle on the drill press works well for this. I have a gadget called a "crotch center" that fits into my tail stock and allows me to drill round shapes right on the lathe. (See photo, page 52.)

Insert the handle in the head, and split the end grain of the tenon with a chisel to accommodate a wedge. (A saw kerf in the tenon will also work.) Remove the handle, put some glue on the handle tenon, and reinsert the handle in the mallet head. (You did all your sanding and finishing on the lathe. Right?) Drive in a hardwood wedge to pin things tight. Make sure the wedge goes perpendicular to the grain of the mallet head or the head could split. Trim off the end of the tenon and you're done.

A word about balance. The balance point of the mallet should be about 6 in. to 8 in. from the head. You may want to experiment with different handle shapes and diameters to adjust the balance.

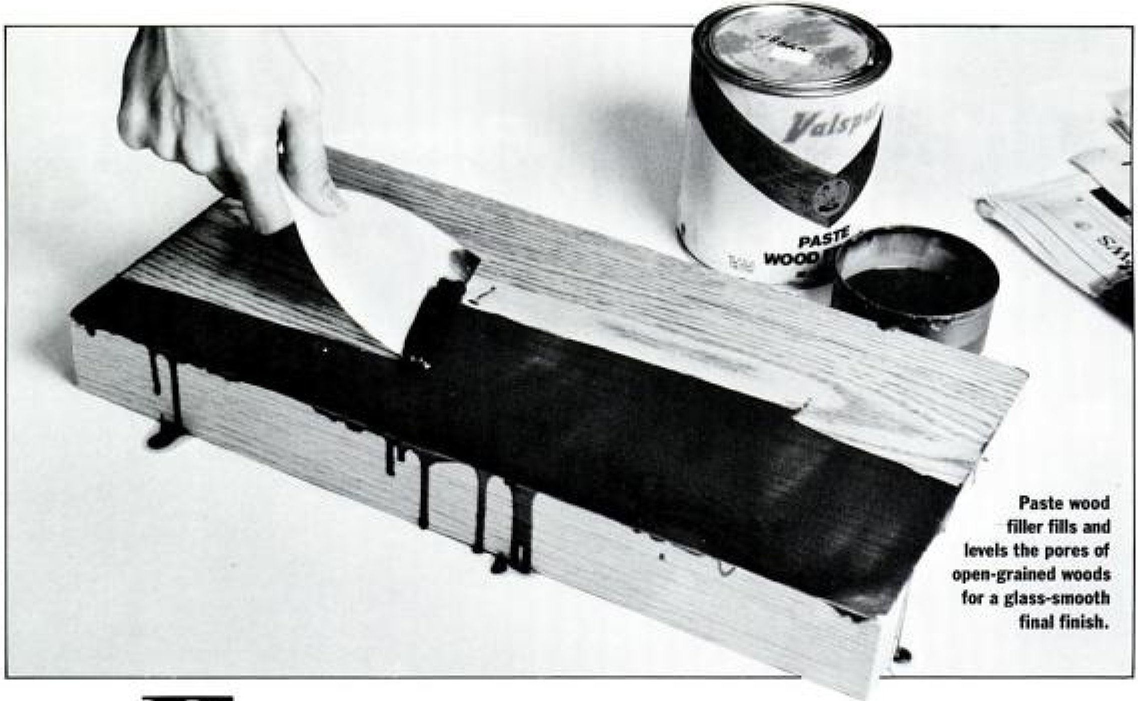
Stakes for six-wicket croquet are $1^1/_2$-in. dia. and 18 in. long above ground. You only need one stake per set. Stakes for nine-wicket backyard croquet can be 1-in. in dia. but should still be 18 in. long above ground. You'll need two stakes for backyard croquet. You can make wickets by bending $^7/_{16}$-in. dia. steel rod to the dimensions shown in the chart. ▲



Ernie Conover is a contributing editor of AW and owner of Conover Woodcraft Specialties in Parkman, Ohio. He wrote about sharpening in the March/April, 1988 AW.

SOURCES

UNITED STATES CROQUET ASSOCIATION (USCA), 500 Ave. of Champions, Palm Beach Gardens, FL 33418, (407) 627-3999. A croquet rule book is available for $5.00.
WOOD-PLY LUMBER, 100 Bennington Ave., Freeport, NY 11520, (516) 378-2612. Lignum vitae wood for turning balls and mallets.
CROQUET INTERNATIONAL LTD., 7100-23 Fairway Dr., Palm Beach Gardens, FL 33418, (407) 627-4009. Class A and Class B croquet balls, wickets and other equipment.



Paste wood filler fills and levels the pores of open-grained woods for a glass-smooth final finish.

Filling the Grain

Paste Wood Filler Levels the Pores for a Glass-Smooth Finish

BY WALTER MORRISON

Woods like oak, ash, walnut and mahogany have large, open pores that show through the final finish. This open-pored, "natural" look is just fine in most cases, but there may come a time when you want a mirror-smooth finish on an open-pore wood. On a tabletop, for example, the open grain can trap liquids, food, dust and dirt. The solution is to fill and level the pores with a paste wood filler before applying the final finish.

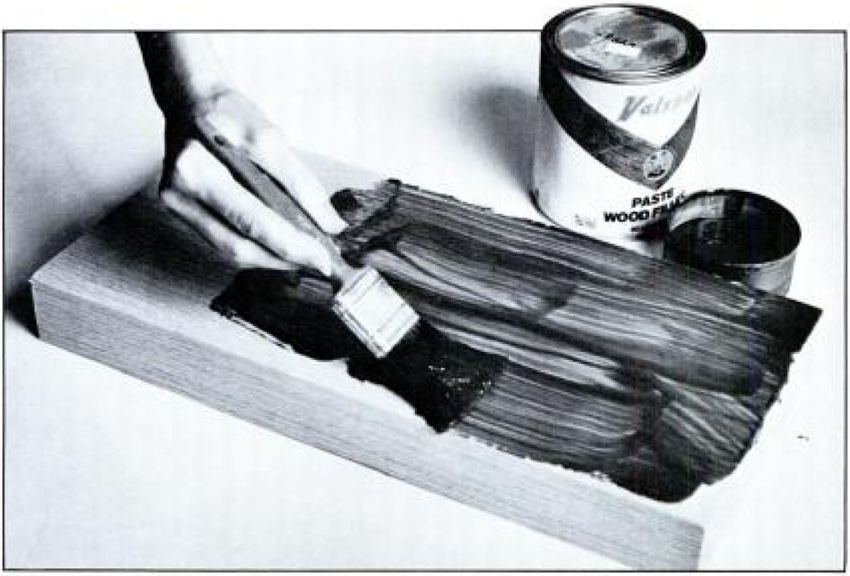
Paste wood filler (not to be confused with conventional-type wood fillers used to patch surface defects and nail holes) is a goopy mixture of ground quartz (called silex) combined with solvent and oil to form a thick paste. You brush a heavy coat of filler over the wood, and wipe off the excess with a rag before it dries hard. Some filler stays behind in the pores, where it hardens, and after the filler dries, a light sanding levels the surface. The final finish goes on smooth and flat, without dipping into all those thirsty, open pores.

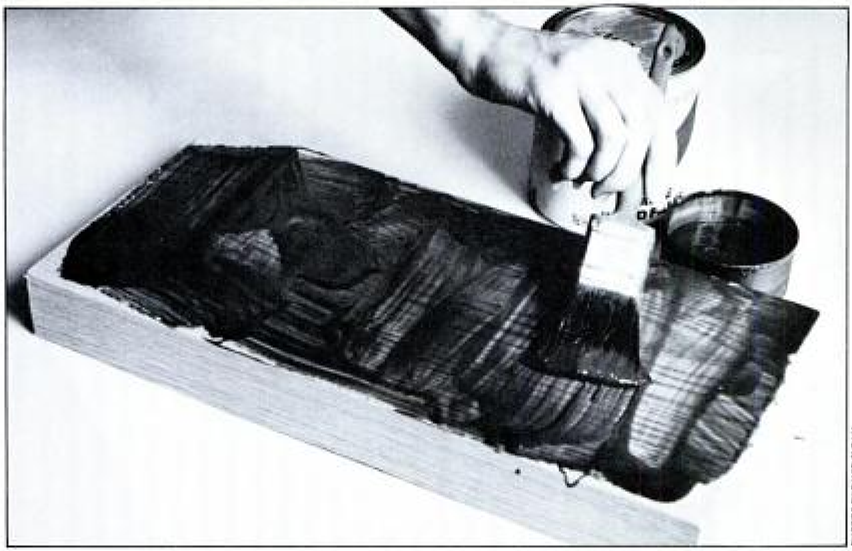
Wood that's been filled before finishing reflects light differently from unfilled wood under the same finish. The unfilled surface appears to have greater depth because of grain variations. Closed-grain areas are highly reflective; porous areas appear flat. On a filled surface, the surface reflects light more uniformly, de-emphasizing the grain pattern beneath.

Paste wood filler comes in a can, and is sold by most well-stocked paint stores, as well as mail-order supply houses like Garrett Wade, Constantine's and Woodcraft. Paste filler comes in a variety of wood tones, but you can buy "natural" color filler (generally, a light tan color) and tint it yourself by adding a little oil stain, japan color, or universal color (the stuff in those pumps at your local paint store). If you're adventuresome, you can even experiment with bright colors for interesting effects.

Applying the Filler

Do all the finish sanding before mixing and applying the filler. Paste wood filler must be thinned with mineral spirits or turpentine—it's too thick to use





Apply the filler with a stiff brush, working across the grain to force the filler into the pores.

PHOTOS BY DAVID SLOAN

directly from the can. I thin with turpentine for the brand of filler I buy, but use whichever solvent the manufacturer recommends. Be sure to follow the thinning instructions that appear on the can.

If you plan to stain the wood, you can stain and fill in one step with most fillers. Simply mix an oil stain with the paste wood filler as you thin it. I prefer to apply the filler first and stain the wood afterward, because it gives me more control over the color.

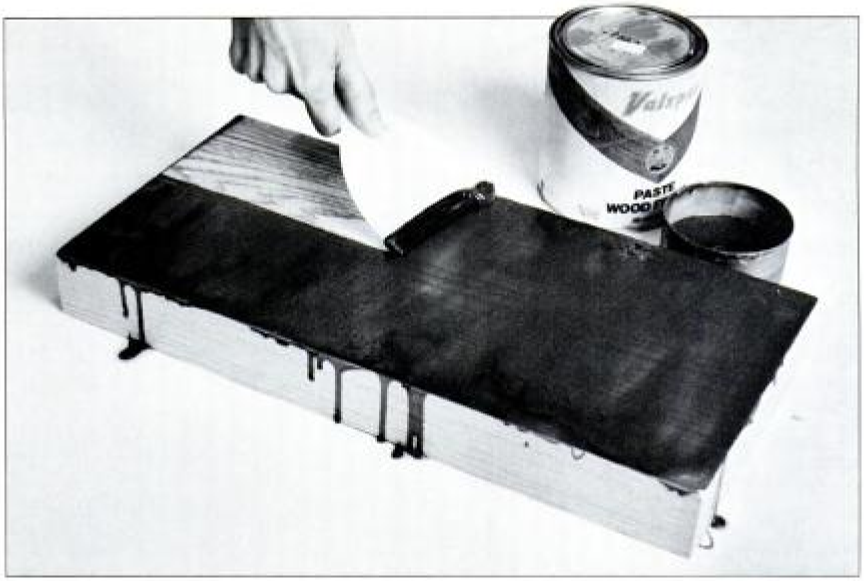
Start off by mixing a small amount of the paste wood filler with mineral spirits or turpentine (I use an empty tuna can), along with any color you wish to add, until you get a mixture with the consistency of pancake batter.

Next, with a stiff paint brush, apply the paste wood filler to the surface by brushing the filler across the grain. Work the filler into the pores with the flat side of the brush. Brush the filler over the entire surface, including areas that may seem to need no filling. The filler will add some color to the surface, and you want the color to be uniform over the whole surface.

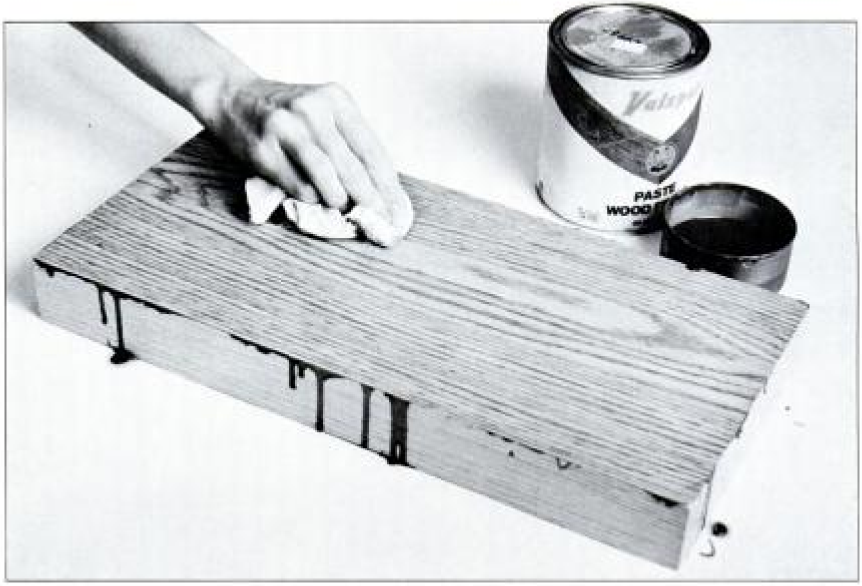
The next step is removing the excess filler from the surface. Allow the filler to dry until the surface starts to look dull and flakes off when touched—about 30 minutes with the brand I use. The filler will still be a little sticky, but it shouldn't be too moist or you'll end up wiping the filler out of the pores. Getting a feel for the proper amount of drying time takes a little practice. Whatever you do, don't let the filler dry hard, or it will be very difficult to remove.

When the filler has set, skim the surface with a plastic putty knife in the directon of the grain to remove most of the excess filler. (A metal putty knife can scratch the wood.) Next, wipe off the remaining paste wood filler with a rag. Some finishers swear by burlap, but I prefer to use a terry-cloth or cotton rag. Begin by wiping in circles, turning the rag frequently. Then, with a clean rag, finish wiping the panel lightly in the direction of the grain to make sure no lumps of filler remain. Don't wipe so hard that you pull the filler out of the pores.

Now let the surface dry for at least 24 hours. Be sure



Allow the filler to dry until the surface dulls, then skim off the excess with a plastic putty knife.



After scraping off the excess, wipe the filler off the surface with a rag. First wipe in circles, then wipe lightly with the grain.

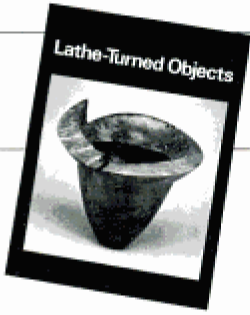
to dispose of the wiping rags and dried wood-filler residue properly. I always make a point of putting this material outside in a metal can as soon as possible to avoid the danger of fire caused by spontaneous combustion. It's also a good idea to soak the rags in water before disposing of them.

After the surface has dried, inspect it to see if there is any need for a second coat of filler. Occasionally, a little touch-up may be required if the filler was not sufficiently dry when rubbed off. If necessary, redo the particular areas with another application of filler.

If the pores are filled, you're ready for a light sanding. Then, it's time for the final finish. In my case, I apply a coat of stain and two or more coats of polyurethane varnish, rubbed between coats with 320-grit paper and 0000 steel wool after the final coat. I buff the final finish with terry cloth to bring up the final luster. For an additional sheen, I also rub the surface with a pad soaked in oil and dipped in rottenstone. I've had good success with this finish, as the turpentine and polyurethane appear to be compatible, and I've had no adhesion problems. Just to be safe, it's always a good idea to test the compatibility of a finish on a piece of scrap that's been filled with paste wood filler, before you finish an entire project. ▲

Walter Morrison is an engineer and woodworker in Northport, NY. He wrote about building a mantel in the July/August, 1988 AW.

BOOKS & VIDEOS



BOOKS

Lathe-Turned Objects: An International Exhibition

edited by Albert LeCoff
(1988, Wood Turning Center, Inc., P.O. Box 25706, Philadelphia, PA 19144) 148 pp; paperback, $31.95; hardcover, $42;

It's all here. Burls turned so incredibly thin we wonder how the natural shapes of the crumbling edges were preserved. Objects made from large turnings which are then cut up and recombined so cleverly we do not associate their origins with the lathe. Tiny goblets of such excellent proportion and craftsmanship that, without an object added to the photo for scale, we would think them to be full-size. Ingenious laminations of diversely colored materials which, when turned into plates or vessels, reveal patterns of pleasing complexity. Pieces which deliberately contrast rough tooling marks and naturally craggy surfaces with surfaces so glassy smooth they appear to be ponds rich in underwater life.

All the expected and unexpected tricks of the turners'are beautifully presented, predominantly in color, in *Lathe-Turned Objects*, a catalog of the International Turned Objects Show, held in Philadelphia in 1988. While small amounts of text have been devoted to the thoughts of both the artists and the organizers, the focus is rightfully on the objects.

To my mind, I would like to have seen more concern—both in work and print—with two issues. First, what makes the process of turning definitive of a genre? Second, why are the vast majority of the objects one-of-a-kinds or objects possessing only an aesthetic function when the history of the lathe has so much to do with a quest for the precision necessary for replication and mechanical functioning? But, these quibbles should in no way discourage anyone interested in turning, woodworking or just beautiful objects from looking for, or purchasing this handsome book.

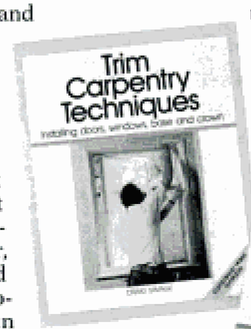
JOSH MARKEL

Trim Carpentry Techniques: Installing doors, windows, base and crown

by Craig Savage
(1989, Taunton Press, 63 S. Main St., Box 355, Newtown, CT 06470) 196 pp; paperback, $17.95)

The death of the apprenticeship system, coupled with the rise in interest of woodworking as a hobby, has left a gap in knowledge that *Trim Carpentry Techniques* has gone a long way toward filling.

This book deftly covers the domain of the finish carpenter. From installing doors and windows to fitting baseboards and crown moldings, Craig Savage knows his stuff. You will find all the little tricks-of-the-trade, that make a difficult job routine, presented in a clear, well-organized format. As a bonus, there is an excellent chapter on making your own moldings, relying on a router table and molding head—something most of us can relate to. The book starts with a chapter defining trim and gives an interesting history of the evolution of moldings from Greek origins to the present day. A section on tools used by the trim carpenter details a minimal kit to be carried from job to job. The installation of the basic elements of trim moldings is discussed, and Savage provides a chapter on several methods of making frame-and-panel wainscoting that could serve as a primer for all types of frame-and-panel work. And, he doesn't leave the end of the job out either, with an overview of finishing with both clear finished and painting techniques.



Whether you are planning on adding crown molding to the living room, or trimming out an entire house; even a pro will pick up some tips from this book.

BEN ERICKSON

VIDEO

Installing Trim

with Craig Savage
(1989, The Tauton Press, 63 S. Main St., Box 355, Newtown, CT 06470) 60 min.; VHS/Beta, $29.95; Book/Video set, $39.95.

If a picture is worth a thousand words, a video must be worth a thousand pictures. In such a physically demanding field as woodworking, there's no substitute for observing an experienced craftsman at work.

In the video *Installing Trim* by Craig Savage (the companion to his book *Trim Carpentry Techniques),* the viewer is taken step-by-step through the most common situations encountered by the finish carpenter. The tape opens with a description of the three basic joints used in installing moldings: the butt, miter and cope. This is followed by an introduction to the setup and use of the fundamental tool of the trade these days, the power miter box. Next, Savage deftly demonstrates installation of door and window facings in several styles, with special emphasis on solving common problems encountered on the job.

The rest of the video is devoted to the installation of baseboards and crown moldings. While this section is well done, I would have liked more time devoted to installing crown.

Overall, the tape is well-crafted, and with corresponding page numbers displayed on the screen, provides a useful accompaniment to the book. Its strong point is the stress placed on working around flaws found on almost every job site.

The video, by necessity, covers only the high points of Savage's book, and if funds are limited, I would opt for the book before the tape. Together, they complement one another beautifully.

BEN ERICKSON

It's not surprising that one out of four pharmaceuticals comes from tropical forests. Or that an estimated 1,400 tropical plants, like the rosy periwinkle, have promising anti-cancer properties. After all, as home to half of the world's plant and animal species, these forests are a vast biochemical warehouse.

What is surprising is that the human race is destroying this living resource at an alarming pace.

Each day, 74,000 forested acres are cleared, pushing untold numbers of species toward extinction.

The future of medicine and agriculture, the existence of thousands of wildlife species, and the survival of hundreds of millions of people in developing countries depend on what we do now to keep the tropical forests alive.

The means of solving this problem are within our reach. Write in order to find out how you can help keep the tropical forests alive, before the reasons disappear.

Keep Tropical Forests Alive.

Tropical Forest Project, World Resources Institute, 1735 New York Avenue, N.W. Washington, D.C. 20006/Prepared by Richardson, Myers & Donofrio, Inc.

INDEX

1988-1989

The letters after each entry indicate the months of the issue (ie., JF stands for January/February). The year and page numbers follow.

INDEX

1988-1989

E

F

QUICK-REFERENCE GUIDE TO GENERAL ARTICLES

Buyer's Guides

Profiles

Projects

Techniques

Tools

Toys

INDEX

1988-1989

1988-1989

INDEX

1988-1989

ALABAMA

CRAFT SHOWS

Mobile:

March 31-April 1

The Craft Bugs' Pre-Easter Extravaganza. Greater Gulf State Fairgrounds, Cody Rd. and Ziegler Blvd., Mobile, AL 36689. (205) 344-0205.

ALASKA

WORKSHOPS

Anchorage:

March 3

Shopsmith Setup/Maintenance. Instructor: Ray Schoendaller. 829 Oceanview, Anchorage, AL 99520. (907) 345-3077.

March 17

Relief Carving. Instructor: John Magee. 6731 E. 99th St., Anchorage, AL 99520. (907) 345-3077.

March 24

Stripped Canoes. Instructor: Ted Bourneman. 13420 Tahoe Cl., Anchorage, AL 99520. (907) 345-3077.

March 31

Scroll Saw Work. Instructor: Phyllis Walker. 1947 Commodore, Anchorage, AL 99520. (907) 345-3077.

April 21

Shaker Dovetail Box. Instructor: Jerry Clark. 2501 Maylen, Anchorage, AL 99520. (907) 345-3077.

April 28

Kayak Building. Instructor: Mark Carr. 12300 Heritage, Anchorage, AL 99520. (907) 345-3077.

ARIZONA

WOODWORKING SHOW

Phoenix:

March 9-11

Arizona Woodworking Show. Veterans Memorial Coliseum, 1826 W. McDowell Rd., Phoenix, AZ 85005. (800) 826-8257.

CALIFORNIA

EXHIBITION

San Francisco:

March 30-April 1

Contemporary Arts Festival. Arts Center, 111 Liberty St., Petaluma, CA 94952. (800) 321-1213 or (707) 778-6300.

WOODWORKING SHOW

San Jose:

March 16-18

California Woodworking Show. San Jose Civic Auditorium, 145 W. San Carlos St., San Jose, CA 95110. (800) 826-8257.

WORKSHOP

Crescent City:

February 26-March 3

Basic Carving and Painting of Songbirds. Instructor: Peter Kaune. Lighthouse Art Center, 575 Hwy. 101 South, Crescent City, CA 95531. (707) 464-4137.

COLORADO

WOODWORKING SHOW

Denver:

March 2-4

Colorado Woodworking Show. National Western Complex, 1325 E. 46th St., Denver, CO 80216. (800) 826-8257.

CONNECTICUT

WORKSHOP

Brookfield:

March 19

Hollow Turning. Instructor: Toby Winkler. Brookfield Craft Center, 286 Whisconier Rd., Brookfield, CT 06804. (203) 775-4526.

DELAWARE

EXHIBITION

Wilmington:

March 9-May 13

Non-Traditional Works by Wendell Castle. Delaware Art Museum, 2301 Kentmere Pkwy. Wilmington, DE 19806. (313) 833-7963.

GEORGIA

WOODWORKING SHOW

Atlanta:
March 23-25
Atlanta Woodworking Show. Lakewood Fairgrounds, 2000 Lakewood Ave., Atlanta, GA 30315. (800) 826-8257.

ILLINOIS

WOODWORKING SHOW

Villa Park:
April 20-22
Chicagoland Woodworking Show. Odeum, 1033 N. Villa Ave., Villa Park, IL 60181. (800) 826-8257.

LOUISIANA

WOODWORKING SHOW

Baton Rouge:
March 16-18
1st-Annual Baton Rouge Show. Features cabinetmaker, Gotlieb Brandli. Riverside Centroplex, 275 S. River Rd., Baton Rouge, LA 70821. (800) 521-7623.

MASSACHUSETTS

EXHIBITIONS

Boston:
December 8-March 11
New American Furniture. Museum of Fine Arts, 465 Huntingdon Ave., Boston, MA 02115. (617) 267-9300.

Worcester:
February 10-March 17
Woodturners of the Northeast 1990. Worcester Center for Crafts, 25 Sagamore Rd., Worcester, MA 01605. (508) 753-8183.

SEMINAR

Worcester:
March 17-18
Seminar/Critique with Michael James. Worcester Craft Center, 25 Sagamore Rd., Worcester, MA 01605. (508) 753-8183.

WORKSHOP

Worcester:
April 7-8
Design Workshop. Instructor: Michael Fortune, Canadian furniture designer. Worcester Craft Center, 25 Sagamore Rd., Worcester, MA 01605. (508) 753-8183.

MAINE

WOODWORKING SHOW

Portland:
April 27-29
1st-Annual Portland Show. Portland Expo Building, 239 Park Ave., Portland, ME 04102. (800) 521-7623.

MICHIGAN

WORKSHOP

South Haven:
February 3-March 24
Beginning Boatbuilding. Instructor: Michael Kiefer. Great Lakes Boat Building Co., 815 Wells, South Haven, MI 49090. (616) 637-6805.

MONTANA

EXHIBITION

Billings:
March 16-18
1st-Annual "Good Wood Show." Instructor: Bob Lund. 2039 Walter Rd., Billings, MT 59102. (406) 656-2051.

NEBRASKA

WOODWORKING SHOW

Omaha:
May 4-6
Nebraska Woodworking Show. Askarben Field, 63rd & Shirley Sts., Omaha, NE 68106. (800) 826-8257.

NEW JERSEY

WOODWORKING SHOW

Marlboro:
March 2-4
Carving Decoys and Shooting Stools. Professional, amateur and novice classes.

Demonstrations, seminars, exhibits. Marlboro High School, Rt. 79, Marlboro, NJ 07746. (201) 899-1710.

NEW MEXICO

WORKSHOP

Albuquerque:

April 14-15 & 21-22

Building the Norwegian Pram. 1414 Silver St., Albuquerque, NM 87104. (505) 243-7234.

NEW YORK

EXHIBITIONS

New York City:

March 21-April 28

Mondo Materialis Exhibition. Pacific Design Center's Murray Feldman Gallery, New York City, NY 10021. (201) 382-8700.

May 20-23

International Contemporary Furniture Fair. Jacob K. Javits Convention Center, 655 W. 34th St., New York City, NY 10001. (201) 216-2000.

SEMINAR

Rochester:

April 27

Woodturning. Lecture: Rude Osolnik. Margaret Woodbury Strong Museum, Rochester, NY 14607. (716) 223-4877.

WOODWORKING SHOW

Hamburg:

April 6-8

2nd-Annual Buffalo Show, Erie County Fairgrounds, Hamburg, NY 14075. (800) 521-7623.

WORKSHOPS

Rochester:

March 16

Furniture Finishing and Restoration. Lecture: Homer Formby. Margaret Woodbury Strong Museum, Rochester, NY 14607. (716) 223-4877.

April 28-29

Woodturning. Instructor: Rude Osolnik. Woodturner's Society Inc., Rochester, NY 14617. (716) 442-3486.

NORTH CAROLINA

EXHIBITIONS

Ashville:

March 18-May 12

"American Wildfowl Decoys: An Art of Deception." The Folk Art Center, Milepost 382, Ashville, NC 28815. (704) 298-7928.

March 18-May 12

Contemporary American Decoys. Southern Highland Handicraft Guild. The Folk Art Center, Milepost 382, Ashville, NC 28815. (704) 298-7928.

WORKSHOPS

Brasstown:

April 6-8 & April 8-14

Woodturning. Instructor: John Jordan. John C. Campbell Folk School, Rt. 1 Box 14A, Brasstown, NC 28902. (800) 562-2440.

April 2-May 5

Sharpening and Care of Carving Tools. John C. Campbell Folk School, Rt. 1 Box 14A, Brasstown, NC 28902. (800) 562-2440.

PENNSYLVANIA

WOODWORKING SHOW

Hershey:

March 17-19

5th-Annual Northeast Wood Products Expo. Hershey Lodge and Convention Center, Hershey, PA 17033. (617) 482-3596.

OHIO

WOODWORKING SHOW

Cleveland:

April 6-8

Greater Cleveland Woodworking Show. I-X Center, 6200 Riverside Dr., Cleveland, OH 44135. (800) 826-8257.

OKLAHOMA

WOODWORKING SHOW

Oklahoma City:

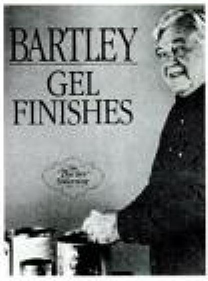
March 9-11

1st-Annual Oklahoma Show. Myriad Exhibi-

FYI CATALOG SHOWCASE

Adams Wood Products Inc.

ADAMS WOOD PRODUCTS, INC. Professional looking furniture made easy — wood parts include legs, arms, and turned columns for tables, chairs, etc. in Chippendale and Queen Anne style. Also chairs and tables to assemble and finish. Woods include cherry, oak, mahogany, walnut. Small quantities usually in stock. Free Brochure Packet. Circle no. 1



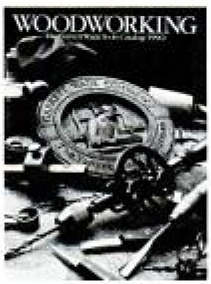
THE BARTLEY COLLECTION. Bartley Gel Stains and Varnish can be applied effortlessly, no brushes required! Dry to the touch in minutes and actually repel dust. Recoat in 4-6 hours. Highly acclaimed by users for years. Free information. Circle no. 3

CASCADE TOOLS, INC.

CASCADE TOOL's 1990 Catalog — *It's Free!* Along with the famous S brand cutting tools there are over 50 new items from nail guns to routers. Look at an amazing selection of router bits and shaper cutters at affordable prices. Get one now from Cascade Tools, Inc. or phone toll free at 1-800-235-0272. Circle no. 5

Ebac
Lumber Dryers

EBAC LUMBER DRYERS — "You can kiln dry your own lumber — when you want it" is the theme of Ebac's descriptive literature of our line of dehumidification wood drying systems. Topics include the importance of properly dried lumber, lumber drying for added value, small scale wood drying, and proper drying techniques. Free. Circle no. 6



GARRETT WADE. Garrett Wade's famous full-color, 212-page 1990 catalog. Contains the most comprehensive selection of the best in fine woodworking tools, books, and professional finishing supplies. Also, hundreds of useful tips on tool usage. Cost $4.00. Circle no. 38

Grizzly IMPORTS, INC.

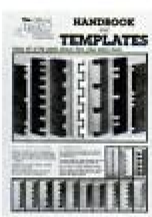
GRIZZLY IMPORTS New 1990 Catalog! You will simply be amazed at the number of new items we have brought on line for 1990. Machinery, accessories and specialty items abound. This catalog is a definite collectable that you will save for years. Use our toll free number 1-800-541-5537 to get your *free* catalog. See ad this magazine. Circle no. 9

HTC

HTC PRODUCTS INC. HTC Mobile Bases, Pedestal Rollers, Roller Tables and Stock Stands provide innovative solutions to traditional shop problems, by making equipment and work mobile. Over 800 high quality machine bases are manufactured in the USA and are applicable to almost every type and variety of Machine, Bench, Cabinet, etc. Free Catalog. 1-800-624-2027. Circle no. 10

HOW-TO BOOK CLUB

The HOW-TO BOOK CLUB is offering you the opportunity to receive 5 books, of YOUR choice, plus a FREE gift for ONLY $3.95! Values up to $134.70! Free details. 1-800-233-1128. Circle no. 11



INCRA JIG — Produce flawless dovetails and box joints, as well as other intricate work on the router table, table saw, and other woodworking machines. New HANDBOOK & TEMPLATES set contains 17 self-adhesive templates plus full-sized plans. Included handbook has 100 illustrated pages with detailed instructions and tips. FREE BROCHURE. Circle no. 12

KINCO. Don't let weeds, brush, and saplings take over your land. Self-propelled, walk-behind sickle bar mower cleans up your off-lawn property quickly and easily. Handles any terrain you can walk. Special direct-from-factory savings. Free literature. Circle no. 13

KLOCKIT™

KLOCKIT. Discover the rewarding experience of clockmaking! Free 64-page color catalog features the lowest prices on quartz clock movements, kits for all skill levels, dials, hands, hardware and other clockmaking components, plus much more! Free Catalog. Circle no. 14

KUSTER MFG
BELLE MEAD, NEW JERSEY

KUSTER MANUFACTURING. Ask for full product literature and prices on Kuster Manufacturing's line of professional sanders. Prices start at $1650. Kuster offers drum, wide-belt and brush sanders. All units incorporate straight-forward design and field proven components. Backed by Kuster's famous guarantee. Helpful telephone specialists will answer your questions at 1-800-458-7837. Circle no. 15

Check out the useful product catalogs on these pages – then use the FYI Card opposite to order now!

MLCS Ltd.

MLCS LTD. ROUTER OWNERS —LARGE DISCOUNTS! New 24 page catalog featuring hundreds of high quality *"carbide tipped"* router bits, the "Router Speed Control" and the "Merle Adjustable Corner Clamp," plus other Professional Woodworking Products. Prices 50% to 70% lower than elsewhere. Value, Quality and Prompt Service Guaranteed! Free. Circle no. 17

1904 MARLING LUMBER COMPANY

MARLING LUMBER COMPANY is your full line Makita Power Tool and Accessory Dealer. Prompt same day shipping in most cases. We're here to serve you better; put us to work for you today. Just a phone call away. 1-800-247-7178 for Makita Mini-Catalog. Free. Circle no. 18

nyle DRY KILN SYSTEMS

NYLE CORPORATION. Lumber Drying — Nyle Corporation, the largest manufacturer in the United States of dehumidification Dry Kiln Systems, offers Introduction to Dehumidification Lumber Drying. Free. Circle no. 19

PERFORMAX DRUM SANDERS — Exclusive features at an affordable price for precise wide surface sanding. The complete line includes the retrofitting Performax Component Sander, the Pro Max and the new Super Max. New accessories for production-mode sanding of pieces as small as 2¼" long. Brochure. $1.00 (Super Max pictured) Circle no. 40

WILKE MACHINERY COMPANY

WILKE MACHINERY COMPANY. A new, 52-page catalog of fine BRIDGEWOOD wood and metalworking machinery is available from Wilke Machinery for $1.00. The catalog features Wilke's exclusive line of BRIDGEWOOD machinery available for purchase or lease. The BRIDGEWOOD line includes industrial quality, heavy-duty machines for serious, amateur and professional mechanics. Circle no. 41

W&H

WILLIAMS & HUSSEY. Anytime, anywhere, any wood with the Williams & Hussey molder-planer. Picture Frames, Crown Moldings, Raised Panels, Curved Panels, Curved Moldings and more. Easy two-minute cutter change-over makes it easy to plane hardwoods and cut moldings. Five-Year Warranty & Free 30-Day Trial. Free information. Circle no. 24

Wood-Mizer®

WOOD-MIZER PRODUCTS. Examine our line of portable band-saw mills. Allows from novice to experienced sawyer to safely convert standing logs to lumber. Our SolarDry™ Kiln or VacuKiln™ dries your lumber, increasing its value. We manufacture some of the most progressive woodworking equipment on the market. Product videos, 44 page catalogue available. Free. Circle no. 25

WOODCRAFT®

FREE WOODCRAFT SUPPLY CATALOG — 120 full-color pages packed with new products and best-selling tools, supplies, kits and books for every woodworking interest — furniture and cabinet making, carving, woodturning, home repairs, antique restoration, boat building, picture framing and more. Free Carving Catalog, too! WOODCRAFT SUPPLY CORP. 1-800-225-1153. Circle no. 26

QUALIFY TO WIN this ELU™ Plunge Router

Product Features

- 2¼ horsepower
- Variable speed control
- Rack and pinion depth adjuster
- Side fence with new fine adjuster
- 1 year warranty
- 1 year free maintenance!

ENTERING IS SIMPLE!

- Fill out the FYI Product Literature Card.
- Circle numbers corresponding to literature requested. (All cards will be entered for drawing. NO PURCHASE NECESSARY.)
- Cards must be postmarked by April 30, 1990.
- Drawing will be held May 15, 1990.
- For additional Product Literature Cards, please write to: Sharon George, Rodale Press, Inc., 33 East Minor Street, Emmaus, PA 18098.

AMERICAN WOODWORKER™

tion Convention Center, Oklahoma City, OK 73102. (800) 521-7623.

WORKSHOP

Tulsa:

March 24

How to Build Tables. Instructor: Dean Hawley. Paxton Beautiful Woods, 5420 S., 99th East Ave., Tulsa, OK 74146. (918) 665-2411 or (800) 722-3608.

OREGON

WORKSHOP

Portland:

February 18

Wood Instrument Making. Oregon School of Arts and Crafts, 8245 SW Barnes Rd., Portland, OR 97225. (503) 297-5544.

Woodworker's Calendar listing is free and restricted to woodworking workshops, seminars, trade shows, exhibitions, craft shows, etc. Listing should state exact address of event, including zip code, and a contact phone number. Send listing at least two months prior to date of event to: AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098.

TENNESSEE

WORKSHOPS

Gatlinburg:

March 5-9

Woodturning and Design. Instructor: Leo Doyle. Arrowmont School of Arts and Crafts, Box 567, Gatlinburg, TN 37738. (615) 436-5860.

March 12-16

Bowl and Plate Turning, Carving. Instructor: Alan Stirt. Arrowmont School of Arts and Crafts, Box 567, Gatlinburg, TN 37738. (615) 436-5860.

March 19-23 & 26-30

Woodturning—Artistic/Fundamental. Instructor: Ray Key. Arrowmont School of Arts and Crafts, Box 567, Gatlinburg, TN 37738. (615) 436-5860.

TEXAS

WOODWORKING SHOW

Houston:

March 2-4

2nd-Annual Houston Show. Passadena Convention Center, Pasadena, TX 03264. (800) 521-7623.

UTAH

WOODWORKING SHOW

Salt Lake City:

April 27-28-29

Utah Woodworking Show. Salt Lake Palace, 100 S.W. Temple St., Salt Lake City, UT 84101. (800) 826-8257.

VIRGINIA

WOODWORKING SHOW

Richmond:

March 30-April 1

Metro-Richmond Woodworking Show. Richmond Centre, 400 E. Marshall St., Richmond, VA 23219. (800) 826-8257.

WASHINGTON

WOODWORKING SHOW

Seattle:

February 1-March 31

National Woodturning Show. Northwest Gallery of Fine Woodworking, 317 NW Gilman Blvd., Issaquah, WA 98027. (206) 391-4221.

WORKSHOP

Seattle:

March 17-25

Building a Lapstrake Canoe. Center for Wooden Boats, 1010 Valley St., Seattle, WA 98109. (206) 382-2628.

WEST VIRGINIA

WORKSHOP

Elkins:

April 23-29

Spring Dulcimer Festival. Augusta Heritage Center, Davis & Elkins College, WV 26241. (304) 636-1903.

AMERICAN WOODWORKER Wants to Keep You Satisfied!

Our customer service department is dedicated to making sure you're completely satisfied with AMERICAN WOODWORKER magazine.

If you have problems with your bill or have any questions concerning your subscription, write us at the address below. Always enclose your current mailing label so we can respond quickly.

AMERICAN WOODWORKER
Customer Service
Emmaus, PA 18098
(215) 967-8154

C L A S S I F I E D   A D S

CLASSIFIED RATES: $70.00 for 15 words or less, $5.00 for each additional word. **Payment to accompany order or use MasterCard/Visa.** All advertising offers are understood to carry a money-back guarantee by advertisers. ALL COPY SUBJECT TO APPROVAL. Advertisements received after the closing date will be scheduled in the next available issue.

Please mail before March 2 for May/June issue.

THE MARKETPLACE is for use by individuals only; the rate is $5.00 per line. Minimum 3 lines; maximum 6 lines; limit 3 insertions per year.

DISPLAY CLASSIFIED rates available on request.

Send advertising copy, heading and payment to: **Classified Advertising Dept., AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098 or call Karen Grossman, Classified Sales Representative – (215) 967-5171, Ext. 1812.**

BOOKS & PERIODICALS

INFORMATIVE CATALOG FOR WOODWORKERS, woodcarvers, upholstery, antique restorers. Many unusual, hard to find items. Send $1.00 to **VAN DYKE'S Dept. 82, Woonsocket, SD 57385.**

1990 LEATHERCRAFT CATALOG. 100 pages. Largest selection available of genuine leathers, tools, kits, books, supplies. Fine tooling, utility, garment leathers, suedes, exotics. Belt, wallet, moccasin kits and more! Low prices, quantity discounts. Send $2.00 postage/handling to: **TANDY LEATHER COMPANY, Dept. AW390C, P.O. Box 2934, Ft. Worth, TX 76113.**

$1.00 for 4,000
woodworking items in the definitive sourcebook.
Send your $1.00 today to:
CONSTANTINE'S
2057A Eastchester Road
Bronx, NY 10461

CAROUSEL HORSE CARVING (⅓ standard size/smaller). Books/blueprints. **HERITAGE ARTS PRESS, 3315 Sacramento St., San Francisco, CA 94118.**

PROFESSIONAL "SHARPENERS REPORT" ... Monthly Newsletter! Tips—sources—buy/sell used equipment! BROCHURE. **SKOG COMPANY-A3, P.O. Box 22559, Minneapolis, MN 55422.**

SELLING YOUR WOODWORKING CAN BE PAINLESS. Let a veteran show you the ropes. Refundable brochure $1. **GRAPEVINE PUBLICATIONS, 39 West Alexis, Suite 130-A, Toledo, OH 43612.**

BUSINESS OPPORTUNITIES

WOODWORKING INSTRUCTOR to teach and live-in at summer camp for teenagers in New Milford, Connecticut, July–August 1990. **BUCKS ROCK, 193 North Detroit Ave., North Massapequa, NY 11758.** (516) 293-8711.

MY WOODWORKING SHOP MAKES ME $300 WEEKLY, part-time, yours can too! Free details. **RICK GUNDAKER, Dept. 25, 8042 Oliver Road, Erie, PA 16509.**

EMPLOYMENT OPPORTUNITIES

APPRENTICE CABINETMAKER—The Colonial Williamsburg Foundation is seeking candidates interested in hand production of 18th-century Virginia furniture. Position includes daily presentations to the public, hand planing, pit sawing, joinery work, research and design of furniture. Requires high school education, good public contact skills, woodworking experience using hand tools, manual dexterity and good research skills. Must commit to a 6-year apprentice training program for advancement to the journeyman level and have ability to work a flexible schedule including weekends and holidays. Present skills/experience may substitute on a year-for-year basis toward the 6-year training program. Competitive salary and excellent benefits. Submit Colonial Williamsburg Application & resume to: **Employment Specialist, THE COLONIAL WILLIAMSBURG FOUNDATION, P.O. Box C, Williamsburg, VA 23187.** APPLICATIONS MAY BE OBTAINED BY CALLING (804) 220-7000. EOE/AA.

EASY WORK! Excellent Pay! Assemble products at home. Call **(504) 641-8003, Ext. 2743.**

FINISHING SUPPLIES

SPRAY-ON SUEDE ... Free brochure/sample. **DONJER PRODUCTS, Ilene Court–Building 8A, Bellemead, NJ 08502.** (800) 336-6537.

CASTOLITE Liquid Plastics. Crystal clear, colors. For casting, embedding, coating, fiberglassing, repairing and reproducing with our Mold Making Supplies. Catalog $2.00. **CASTOLITE, Dept. 90C/AW, Box 391, Woodstock, IL 60098.**

EPOXIES!—Glue, laminate, repair. (16 oz./$10.00) Also decoupage. **HCH COMPOUNDS, 11455 Newkirk #1420, Dallas, TX 75229.** (214) 243-8494.

HARDWARE

STAINLESS STEEL AND BRASS, screws and bolts. Small quantities, free catalog. **ELWICK, Dept. 769, 230 Woods Lane, Somerdale, NJ 08083.**

PERIOD BRASS FURNITURE HARDWARE—Knobs, pulls, locks, casters, hinges ... More. 74-page catalog $4. **PAXTON HARDWARE, P.O. Box 256-AW3, Upper Falls, MD 21156.** (301) 592-8505.

HELP WANTED

WOODWORKING INSTRUCTORS/HEAD MAINTENANCE, co-ed resident camp—Massachusetts. **CAMP EMERSON, 5 Brassie Road, Eastchester, NY 10707.** (800) 955-CAMP.

INSTRUCTION

PRESERVATION CARPENTRY–two years. Preserve/restore pre-20th century buildings. CABINET/FURNITURE MAKING–two years, custom furniture construction. Traditional styles; hand joinery, embellishment. PIANO TECHNOLOGY–two years. Tuning, action repairs, rebuilding. VIOLIN MAKING/RESTORATION–three years, making; optional fourth year, repair/restoration. Financial aid for qualified students. Accredited member NATTS. **NORTH BENNET STREET SCHOOL, 39R North Bennet Street, Boston, MA 02113.** (617) 227-0155.

INVENTIONS

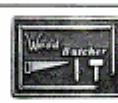
A NEW IDEA? Call **NATIONAL IDEA CENTER** of Washington D.C. free information **(800) 247-6600, Ext. 139.** Come see The Invention Store!!

INVENTORS: Need help? Call **TLCI** for free information **(800) 468-7200** 24 hours/day–USA/Canada.

MISCELLANEOUS

CHAIR CANING SUPPLIES—Webbing, rush, splint, rawhide, cord. Catalog $1 (refundable). **CANING SHOP, 926-AW Gilman, Berkeley, CA 94710.**

***Wood Butcher* belt buckles $16.95**
Solid Bronze Belt Buckles for 1¼ inch belts
Send $16.95 + $1.00 shipping to: **Dusterwald Enterprises P.O. Box 5242 Laurel, MD 20726**
MD residents add 5% sales tax.



BASKET WEAVING/CANING ... Books, hoops, handles, materials, tools. Retail/wholesale. Catalog $1. **ROYALWOOD LTD., 517-AW Woodville Road, Mansfield, OH 44907.**

PLANS & KITS

WOODENTOY—Patterns, wooden parts, books, kits. Catalog—$1.00. Brochure free. **WOODENTOY, P.O. Box 40344-A, Grand Junction, CO 81504.**

FREE, unique toy and craft catalog. **RD ENTERPRISES, P.O. Box 1933, Dept. AW4, Mount Vernon, WA 98273.**

ADULT SIZE ROCKING HORSE PLANS. Fun, easy. $8.50. **ROCKING DOBBIN RANCH, 7172 Summitrose St., Tujunga, CA 91042.**

PLANS FOR DUST COLLECTION SYSTEM BLAST GATE. Simple/inexpensive to make. Send $4.00 + S.A.S.E. To: **J.K. WOODCRAFT, 3398 Aquinas, Rochester, MI 48309.**

LAWN & GARDEN ORNAMENTS!
WOODCRAFT PATTERNS
☐ **YARD CRITTERS** - life size sheep, lamb, ducks, piglet, geese, chickens, more!
☐ **CHARACTERS** - Amish couple, watering girl, bending lady & farmer, Dutch couple, more!
☐ **100 PATTERNS** - birds, butterflies, signs, more!
Send $7.00 per packet or all 3 for only $14.00
ACCENTS Dept. MG30, Box 7387, Gonic, NH 03867
WOODCRAFT CATALOG - $2.00 (Free with order)

WOODEN GEARED, WEIGHT-DRIVEN, pendulum-regulated clock plans. Average skill level. $10.00. **BOB MEYER, Box 275, Elgin, MN 55932.**

BABIES SLEEP BETTER IN A HANDCRAFTED CRIB! Plans/manual for our distinctive design $9.95. **A-CRIB, 911 Jackson Street, Denver, CO 80206.**

SWINGING CRADLE
EASY TO MAKE WITH
Full-Size Plan

Authentic spindle design straight out of Colonial America. Plans show alternate construction with panel sides. Perfect for baby or use for magazines. Size 20" x 39" x 30" high.
Plan #166 ..... $12.00
(catalog free with order)

CATALOG 200 full-size professional furniture plans — **$3.00**

FURNITURE DESIGNS, INC., Dept. NA-30
1827 Elmdale Ave., Glenview, IL 60025 — (708) 657-7526

MAKE TOP SELLING "COUNTRY WOODCRAFTS." 800+ original designs. Catalog $1.00—**WINFIELD COLLECTION, 12044AW Parkin, Fenton, MI 48430.**

WOOD WHIRLIGIGS. Full-size patterns, instructions. Wind-driven 13–22" bee, chipmunk, dog, coyote, roadrunner, cat, songbird, duck. $3.25 each; any four $12.00; all eight $23.00. **A. SKOV, 3380 S. 4th Ave., #26, Yuma, AZ 85365.**

TOOLS & MACHINERY

CUSTOM BRANDING IRONS. Drill press or hand-held. Brochure $1.00. **ENGRAVING ARTS, P.O. Box 787A, Laytonville, CA 95454.** (707) 984-8203.

The Beall Tool Co

Now with
LEFT & RIGHT
hand threads

The penultimate wood threading device. Attaches to your router & makes perfect ½", ¾", and 1" threads. For more information, write: Dept. AW, 541 Swans Rd. N.E., Newark, Ohio 43055. Ph. 614-345-5045. Toll free 1-800-331-4718

WOODTURNING LATHES; bowl, spindle, large swing, long bed, slow speed. **DEROSE & CO., P.O. Box 150, Mechanicsville, VA 23111.** (804) 746-1705.

QUALITY ANTIQUE & OLDER hand tools in bimonthly color catalogue, both English and American for woodworkers/collectors. Subscription (5 issues) $20 with $5 rebate or $5 single issue. **BRISTOL DESIGN, 14 Perry Road, Bristol BS1 5BG, ENGLAND.**

TOOLS & MACHINERY *continued*

FREE ILLUSTRATED CATALOG of fine woodworker's hand tools, books, accessories. Quality craftsman tools at affordable prices. **KREATIVE LINK, Department AW1, Box 2347, Sandy, UT 84091.**

SEARS STYLE MOLDING CUTTER HEAD/molding knives/shaper cutters. See January/February ad page 63. **COROB, 53 Westwood, Shrewsbury, MA 01545.**

NIC SUPER WRENCH replaces 22 box-end wrenches, adjusts $^1/_4$"-$^{15}/_{16}$", metric and standard scales, Swedish alloy steel, lifetime guarantee, editors gift idea December issue Workbench magazine $27.50. **INNOVATIVE TOOL CO., 2555 South Santa Fe Drive, Denver, CO 80223.**

WOOD

BURL, FIGURED LUMBER—Squares, slabs, whole. Sample kits. S.A.S.E. list: **EUREKA HARDWOOD, 3346 D St., Eureka, CA 95501.** (707) 445-3371.

TIGER AND BIRDSEYE MAPLE ... lumber/flooring. **SANDY POND HARDWOODS, 921-A Lancaster Pike, Quarryville, PA 17566.** (717) 284-5030.

HOMECRAFT VENEER–DOMESTIC/IMPORTED VENEERS. 140+ varieties. Complete line: Tools, laminating, marquetry—Cements/glues. Price list $1. **HOMECRAFT VENEER, 901 West Way, Latrobe, PA 15650.**

KILN-DRIED HARDWOOD LUMBER ... Variety of species, thicknesses, grades. Flooring/paneling. No minimum. 25c stamp for list. **GARRESON LUMBER-A, 7201 Craig Rd., Bath, NY 14810.** (607) 566-6558.

TURNING BLOCKS, BURLS/CROTCHES—Imported/domestic. Price list: **WOOD-PLY LUMBER, 100 Bennington Ave., Dept. A3, Freeport, NY 11520.** (516) 378-2612.

KILN DRIED HARDWOOD AND PINE LUMBER, paneling, flooring. Ceramic tile inserts. Free catalog. **CATSKILL MOUNTAIN LUMBER, Box 450, Swan Lake, NY 12783.** (800) 828-9663.

FIGURED MAPLE, quilted, burl, curly boards, blocks, Alaskan Yellow Cedar. **RANDLE WOODS, P.O. Box 96, Randle, WA 98377.** (206) 497-2071.

SELECT–BETTER ... 20 bf. bulk packs: Cherry $1.97 bf.; hard Maple $1.50 bf.;Butternut $2.03 bf.; additional species. MasterCard/Visa. Catalog $1.00. **BADGER HARDWOODS, Rte. 1, Box 262, Walworth, WI 53184.**

MESQUITE LUMBER. S.A.S.E for prices. Include $2.00 for sample. **D. NORDMEYER, P.O. Box 68, Knippa, TX 78870.**

WOODEN PARTS

WOOD SUPPLIES WHOLESALE: Dowels and turnings. FREE CATALOG. **RAINBOW WOODS, 20 Andrews, Newnan, GA 30263.**

SHAKER PEGS, CANDLE CUPS, balls/wheels. Discounted. **HOWEE TOYS, Rt. 7, Box 633AW, Joplin, MO 64801.**

MAPLE DOVETAILED DRAWERS. Fully assembled. Price list. **EAGLE WOODWORKING, 24 Webster Ave. (AMW), Somerville, MA 02143.** (617) 628-4343.

THE MARKETPLACE

FOR SALE: Complete set of Fine Woodworking Magazines issues #1 through #70. $400 or best offer. Call **(215) 791-5127.**

WANTED: Heavy duty wood lathe with 14 inch swing minimum above bed. Call with description and price. **(215) 791-5127.**

If you would like more information about advertising in AMERICAN WOODWORKER, contact:

Jim Owens
AMERICAN WOODWORKER
33 East Minor Street
Emmaus, PA 18098
215-967-5171

AMERICAN WOODWORKER's Advertisers for March/April 1990

SUBJECT TO CHANGE.

CLASSIFIED ORDER FORM

YES

[ ] Place my order in the next issue.

[ ] Please call and advise me how to design my ad to get the best results

RATES: $70.00 for the first 15 words. $5.00 for each additional word.
WORD COUNT: Dictionary words, initials and phone number count as one word, zip code is free. Name of state & city (New York, Los Angeles) and Key characters (AW-4) each count as one word.
TERMS: Payment must accompany order or charged to MasterCard/Visa.
DEADLINES: See rate box at top of classified section.
Call (215) 967-5171 for Classified Display rates.

To: Louise Rader, AMERICAN WOODWORKER Classified, 33 E. Minor St., Emmaus, PA 18098. Here's our copy for the Classified Section of AMERICAN WOODWORKER.

Remittance of $________ is enclosed to cover ______ insertion(s) in the ______ issue(s), under the ______ category.

Bill to my MC/Visa # ____________ Exp. date ______

YOUR NAME ____________ (please print) PHONE ______

FIRM ____________

ADDRESS ____________

CITY ______ STATE ______ ZIP ______

DATE ______ YOUR SIGNATURE ____________

Unlike some projects, boxes leave you room to play. With a chair or a table, you need to deal with questions of comfort and scale. With a box you're pretty much free to experiment. The size and form can be whatever you choose to make them, for whatever it is you aim to contain. This freedom offers the maker an opportunity to explore a personal style. As you see here, even in such a simple form as a box, the craftsperson's style can show through. Pandora would have had a field day.

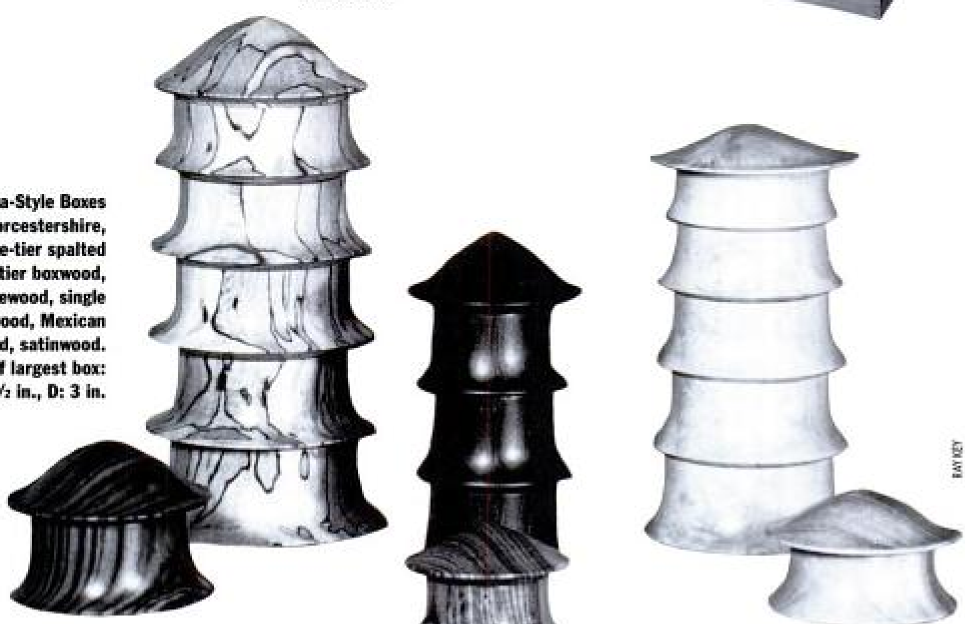
FIONA WILSON

Fortune Boxes by Andy Barnum, Carmel, New York. Ebony, tulipwood. Dimensions: H: $1^1/_2$ in., D: $^7/_8$ in.

Sewing Chest (open).

Sewing Chest by Dan Stalzer, Fort Bragg, California. Bird's-eye maple, quilted maple. Dimensions: W: $17^1/_2$ in., H: $5^1/_2$ in., D: $10^1/_2$ in.

PHOTOS BY SEAN SPRAGUE



Pagoda-Style Boxes by Ray Key, Worcestershire, England. Five-tier spalted beech, four-tier boxwood, three-tier Rio rosewood, single Brazilian tulipwood, Mexican rosewood, satinwood. Dimensions of largest box: H: $5^1/_2$ in., D: 3 in.

RAY KEY

PHOTOS BY SEAN SPRAGUE

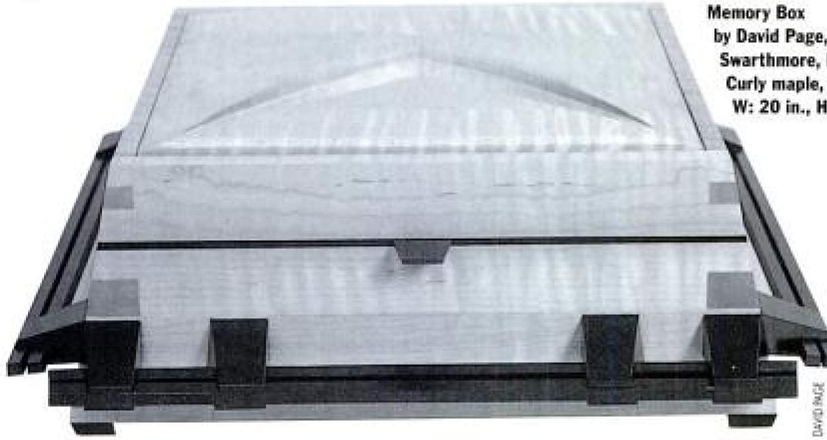
Pillowed Jewelry Box by Dave (L.A.) Heinrichs, Newbury Park, California. Figured red gum, quilted maple, suede. Dimensions: W: 14 in., H: 7 in., D: 8 in.

Pillowed Jewelry Box (open).

SEAN SPRAGUE

Jewelry Chest by Steve Bracken, Boseman, Montana. Cherry, guilted maple. Dimensions: W: 15 in., H: 4 in., D: 10 in.

Memory Box by David Page, Swarthmore, Pennsylvania. Curly maple, ebony. Dimensions: W: 20 in., H: 7 in., D: 17 in.



DAVID PAGE

PHOTOS BY BEN ERICKSON

Jewelry Box by Ben Erickson, Eutaw, Alabama. Walnut, bird's-eye maple. Dimensions: W: 12 in., H: 4 in., D: 7 in.

Jewelry Box (open).

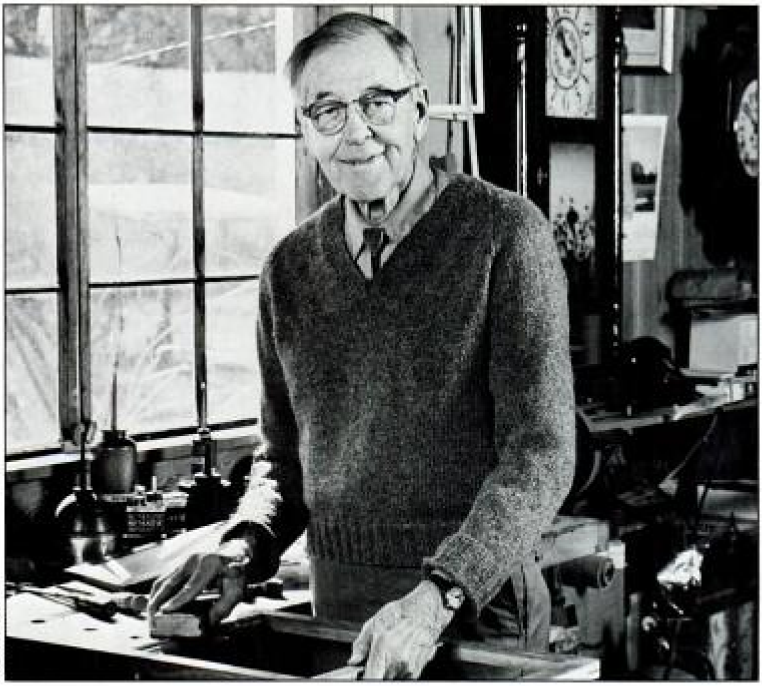
Want to see your work in Gallery? Send photographs and a description of the piece to: AMERICAN WOODWORKER, *33 E. Minor St., Emmaus, PA 18098. Only black-and-white prints (4 in. × 5 in. or larger) or color slides will be accepted. Please do not send color prints or snapshots. Enclose a self-addressed envelope for return of photos.*

Carlyle Lynch—1909-1989

Noted draftsman and furniture-maker Carlyle Lynch died December 12, 1989 at the age of 80. Mr. Lynch is best known for his detailed, measured drawings of antique furniture, beautifully lettered in an elegant flowing script. He was a regular contributor to *AMERICAN WOODWORKER*. In 1954, his furniture drawings were published in a book entitled, *Furniture Antiques Found in Virginia*. At the time of his death he had measured and drawn more than 100 pieces of antique furniture, including Duncan Phyfe's toolbox, John Marshall's desk, and many important pieces from Virginia and North Carolina.

Mr. Lynch was born July 19, 1909 in Covington, Virginia, and graduated from Washington and Lee University in Richmond with degrees in English and history. After World War II, he worked as a draftsman/designer for The Virginia Craftsman, a firm that made antique furniture reproductions for Colonial Williamsburg. During this time, Mr. Lynch began measuring and drawing antiques. Later, he taught drafting, industrial arts and physics for 20 years at Broadway High School in Broadway, Virginia.

In addition to a lifelong interest in antique furniture, Mr. Lynch was an avid beekeeper. He also had a great fondness for antique clocks, and devoted a corner of his workshop to clockmaking equipment.



MITCH MANDEL

Carlyle Lynch in his Broadway, Virginia, workshop, 1988.

Box of Wooden Wonders

Children's games hold a fanciful appeal, even to adults. Marbles, tenpin, mumblety-peg and hopscotch, to name a few, have been favorites for generations. Youngster's delight not only in the activities, but more, they cherish the playing pieces. Consider "cat's eyes" and "puries," sacred stones and lucky pocketknives.

Among these pastimes is jackstraws, a game many of today's progeny may know as pick-up-sticks. The object is the same. The game's parts, usually thin sticks, are dropped in a heap, and the idea is to remove them one by one without disturbing the others. The jackstraw, itself, is a stick with a hook on the end, used to aid the endeavor.

A very special set of these jackstraws belongs to Mary Hitchcock Fuges of Stockton, N.J. It was fashioned by her grandfather Octavius William Bartlett back in the 1870s. Mr. Bartlett was born in 1850 on a farm in Scantic Village, East Windsor Township, Connecticut. He made church organs by trade, working at the Este Organ Works in Brattleboro, Vermont. Around the 1870s there was a recession in the town, and to make ends meet, he took to making sets of wooden jackstraws which he sold at 75 cents a box.

This 120-year-old set is mostly walnut and maple, and what makes it unique is that each of its 26 petite pieces is a carefully carved carpenter's tool or farming implement. The 5-in. box that holds these tiny treasures has a sliding lid, with the words "MARY'S JACK STRAWS" lovingly cut into the top.

According to Mrs. Fuges, the jackstraws actually were made for her mother Mary, and this set and another have been passed down to her and her sister. Three generations of small hands have played the game and coveted the imaginative little tools. After her own children gave these delicate pieces some rough handling, Mrs. Fuges decided they had earned their right to be put on a library shelf and admired from afar.

NANCY WALLACE HUMES

SALLY SHENK ULLMAN

This box of tiny tools is really a game of jackstraws. They've stood the test of time for more than a hundred years.

CIRCLE NO. 11 ON READER SERVICE CARD

To avoid cutting this cover, please use our coupon on page 75.